#28659

Potential Hazardous Waste Site

Site Inspection Report

D.M. STEWARD MANUFACTURING COMPANY, INC. TND 003327251

CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

NARRATIVE SUMMARY
D.M. STEWARD MANUFACTURING COMPANY SITE
TND 003327251

The D.M. Steward site is approximately 1 acre in Chattanooga, Hamilton County, Tennessee. D.M. Steward Company has operated at this location since before 1890 as a manufacturer of slate and ceramic products. The site, which is across the street from the plant, has been used as a dump for construction and demolition debris, defective ceramics, and other plant waste during the entire period. The landfilled area of the site is about 100 x 150 feet and has been filled to a depth of 10-12 feet. The surface is gravelled and is used as a parking lot for D.M. Steward employees. Below the landfill is a filled settling pond which was used until about 1976 for discharge of liquid waste.

The disposal area is in a low, swampy area in which a spring was said to exist at one time. This site presents a hazard due to possible migration of contaminants via ground and surface water, and also from direct contact. The site is not fenced or secured. Analysis of soil samples collected by TDSF/SIU during a site inspection in October, 1985 showed the soil in the area below the fill to be contaminated with several metals, notably lead, nickel, copper, and zinc. Drainage from the site goes either underground or to a tributary of Chattanooga Creek, depending on volume of runoff.

Estimated population at risk from this site is 9621 persons. Estimate is of population within a one-mile radius. There is no known domestic use of surface or ground water in the area.

Facility name: D.M. Steward Manufacturing Co., Inc.

Location: East 36th Street and Jerome Ave., Chattanooga, Tenn.

EPA Region: IV

Person(s) in charge of the facility: John Woody, Marketing Engineer

David Holt, Plant Engineer

Name of Reviewer: G.S. Caruthers Date: 18 February 1986

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill and surface impoundment which received waste from a ceramics manufacturing facility from prior to 1890 until 1976. Major concern is ground and surface water contamination and direct contact. Area is heavily urbanized part of SW Chattanooga. Ground/surface water not used for domestic supply in area. Metals contamination detected in soil at site.

Scores: S_M = 8.5 (S_{gw} = 4.7 S_{sw} = 14.0 S_a = 0)

S_{FE} = Not Rated

S_{DC} = 50

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref (Section)
[1] Observed Release	0 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line [4]. If observed release is given a score of 0, proceed to line [2].					
[2] Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2	6	6	
Net Precipitation	0 1 2 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 2 3	1	1	3	
Physical State	0 1 2 3	1	3	3	
	Total Route Characteristics Score		12	15	
[3] Containment	0 1 2 3	1	3	3	3.3
[4] Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	7	8	
	Total Waste Characteristics Score		25	26	
[5] Targets					3.5
Ground Water Use	0 1 2 3	3	3	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
	Total Targets Score		3	49	
[6] If line [1] is 45, multiply [1] x [4] x [5] If line [1] is 0, multiply [2] x [3] x [4] x [5]			2700	57,330	
[7] Divide line [6] by 57,330 and multiply by 100	S_{gw} = 4.7				

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multi-plier**	**Score**	**Max. Score**	**Ref. (Section)**
1 Observed Release	0 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1	3	3	
1-yr. 24-hr. Rainfall	0 1 2 3	1	3	3	
Distance to Nearest Surface Water	0 1 2 3	2	6	6	
Physical State	0 1 2 3	1	3	3	
Total Route Characteristics Score			15	15	
3 Containment	0 1 2 3	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	7	8	
Total Waste Characteristics Score			25	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 3	2	2	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			8	55	
6 If line 1 is 45, multiply 1 x 4 x 5; If line 1 is 0, multiply 2 x 3 x 4 x 5			9000	64,350	
7 Divide line 6 by 64,350 and multiply by 100	S_{sw} = 14.0				

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1		45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a = Not Rated			

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	4.7	22.09
Surface Water Route Score (S_{sw})	14.0	196.0
Air Route Score (S_a)	0	0
$S^2_{gw} + S^2_{sw} + S^2_a$		218.09
$\sqrt{S^2_{gw} + S^2_{sw} + S^2_a}$		14.768
$\sqrt{S^2_{gw} + S^2_{sw} + S^2_a} / 1.73 = S_M = 8.536$		8.54

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Containment	1 3	1		3	7.1
[2] Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
	Total Targets Score			24	
[4] Multiply [1] x [2] x [3]				1,440	
[5] Divide line [4] by 1,440 and multiply by 100		S_{FE} = Not Rated			

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1	3	3	8.2
3 Containment	0 15	1	15	15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5	15	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4	16	20	
Distance to a Critical Habitat	0 1 2 3	4	0	12	
	Total Targets Score		16	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			10,800	21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{DC} =	50		

FIGURE 12
DIRECT CONTACT WORK SHEET

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

FACILITY NAME: D.M. Steward Manufacturing Co., Inc.

FACILITY DESCRIPTION: Ceramic products manufacturing

LOCATION: East 36th Street and Jerome Ave., Chattanooga, TN.

DATE SCORED: 18 February 1986

PERSON SCORING: G.S. Caruthers

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc):

Site inspection by State SIU team 10/17/85
Tenn. DSWM and SIU files

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

Air Route
Fire and Explosion

COMMENTS OR QUALIFICATIONS:

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Direct groundwater release not observed. [0]

Rationale for attributing the contaminants to the facility:

N/A

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

Knox dolomite is an important aquifer in the region. It and the overlying limestone formations are extensively folded and fractured in the Chattanooga area. Groundwater occurs chiefly in these fractures, which have been enlarged by solution.
Reference 1

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

Saturated soil encountered 8-10 inches below surface during sampling on 10/17/85. [3]
Reference 2

Depth from the ground surface to the lowest point of waste disposal/ storage:

Unknown - estimated 2-3 feet in settling pond area.
Reference 2, Reference 4

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

51.92 in. annual
Reference 6

Mean annual lake or seasonal evaporation (list months for seasonal):

±37 inches annual
Reference 7

Net precipitation (subtract the above figures):
14.92 [2]

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Colbert-Urban: These are Colbert series soils which have been extensively disturbed and altered by urban activities.
Reference 8

Permeability associated with soil type:
very slow - upper layer 0.001-0.01 cm/sec;subsoil <0.0004 cm/sec [1]
Reference 7, Reference 8

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Slurry to settling pond (3)
Inert solids to landfill (0)

Reference 4
Reference 5
Reference 7 [3]

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Landfill
Surface Impoundments
Reference 2

Method with highest score:

Surface impoundment:
no liner, no diversion
Reference 7 [3]

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Barium Oxide	Copper
Nickel	Zinc
Lead	

Reference 2
Reference 9

Compound with highest score:

Nickel: Toxicity 3, Persistence 3
Reference 10, Reference 7 [18]

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

1600 cubic yards estimated [7]

Basis of estimating and/or computing waste quantity:

Based on discharge of 5,000 gpd of slurry @ 0.5% solids
over a period of 50 years. (32.5 yd^3 /yr x 50 = 1625 yd3 total)
Reference 4, Reference 5, Reference 7

* * *

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Industrial process water supply. No known domestic use. [1]
Reference 1, Reference 3, Reference 7

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:
Public water supply available in entire area. [0]
Reference 13, Reference 7

Distance to above well or building:
N/A

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

Industrial process water well, 1.5 miles. No domestic use known. Population served, 0; public water supply available.
Reference 1, Reference 3, Reference 13, Reference 7

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):
urban area; no agricultural use within 3 miles
Reference 13, Reference 11

Total population served by ground water within a 3-mile radius:
None

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

No direct evidence of release. [0]
Reference 7

Rationale for attributing the contaminants to the facility:

N/A

* * *

2 ROUTE CHARACTERISTICS

<u>Facility Slope and Intervening Terrain</u>

Average slope of facility in percent:

0.5%
Reference 11

Name/description of nearest downslope surface water:

Unnamed tributary of Chattanooga Creek.
Reference 11

Average slope of terrain between facility and above-cited surface water body in percent:

1.0%
Reference 11

Is the facility located either totally or partially in surface water?

Partially in surface water. Settling pond is in a swampy area which is periodically inundated.
Reference 2, Reference 11, Reference 13

Is the facility completely surrounded by areas of higher elevation?

No
Reference 11

1-Year 24-Hour Rainfall in Inches

3.15 inches [3]
Reference 7

Distance to Nearest Downslope Surface Water

100 feet [3]

Physical State of Waste

Slurry (est. 0.5% solids) [3]

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Landfill
Surface impoundment
Reference 2

Method with highest score:

Surface impoundment: no diversion, no liner [3]
Reference 7

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated
Nickel
Lead
Copper
Zinc
Reference 9

Compound with highest score:

Nickel: Toxicity 3, Persistence 3 [18]
Reference 10, Reference 7

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

est. 1600 cubic yards [7]

Basis of estimating and/or computing waste quantity:

Based on discharge of 5,000 gpd of slurry @ 0.5% solids over a period of 50 years. (32.5 yd3/yr x 50 = 1625 yd3)
Reference 4, Reference 5, Reference 7

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Recreation (fishing, swimming)
Aquatic life
Reference 13, Reference 14
Reference 15

Is there tidal influence?

No

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None identified
Reference 11

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

0.5 mile via most direct surface drainage to Chattanooga Creek bottoms [1]
Reference 11, Reference 13, Reference 15

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

None identified

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

No identified population

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

Area is heavily urbanized; no agricultural use within 3 miles.

Total population served:

None [0]

Name/description of nearest of above water bodies:

Unnamed tributary of Chattanooga Creek
Reference 11

Distance to above-cited intakes, measured in stream miles.

N/A

AIR ROUTE

NOT RATED

1 OBSERVED RELEASE

Contaminants detected:

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi   0 to 1 mi   0 to 1/2 mi   0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

FIRE AND EXPLOSION
NOT RATED

1 CONTAINMENT

Hazardous substances present:

Type of containment, if applicable:

* * *

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Ignitability

Compound used:

Reactivity

Most reactive compound:

Incompatibility

Most incompatible pair of compounds:

* * *

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Distance to Nearest Population

Distance to Nearest Building

Distance to Sensitive Environment

Distance to wetlands:

Distance to critical habitat:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

<u>Population Within 2-Mile Radius</u>

<u>Buildings Within 2-Mile Radius</u>

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

No incidents observed or reported. [0]

* * *

2 ACCESSIBILITY

Describe type of barrier(s):

No barriers, fencing or security. Area is accessible to public. [3]
Reference 2

* * *

3 CONTAINMENT

Type of containment, if applicable:

Solids in piles on surface; settled solids from surface impoundment on surface or bottom of shallow pond. [15]
Reference 2

* * *

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Barium Oxide Zinc Reference 9
Nickel
Lead
Copper

Compound with highest score:

Nickel: Toxicity 3 [3]
Reference 10, Reference 7

* * *

5 TARGETS

Population within one-mile radius

9621
Reference 12, Reference 11, Reference 7 [4]

Distance to critical habitat (of endangered species)

None identified
Reference 7 [0]

LIST OF REFERENCES
D.M. STEWARD MANUFACTURING CO., INC.
TND 0033237251

1. Groundwater Resources of East Tennessee; Tenn. Dept. of Conservation Bulletin No. 58; by DeBuchananne and Richardson, 1956.

2. Logbook of Site Inspection Activities - D./M. Steward TSFD/SIU; 10/17/85.

3. Hamilton County Well Logs, Tennessee Dept. of Health and Environment, Division of Groundwater Resources, 12/27/82.

4. Letter; J.H. Woody, Jr. of D.M. Steward to Phil Stewart of TDWQC; May 3, 1976.

5. Letter; J.H. Woody, Jr. of D.M. Steward Co. to Wayne McCoy, TDWQC; March 30, 1976.

6. Local Climatological Data - Annual Summary 1981; National Oceanic and Atmospheric Administration.

7. Uncontrolled Hazardous Waste Site Ranking System; Manual HW-10; USEPA; 1984.

8. Soil Survey of Hamilton County, Tennessee; B.W. Jackson, USDA/SCS; 1980.

9. Report of Laboratory Analyses - D.M. Steward Co. Tenn. Dept. of Health and Environment/ Division of Lab Services Nov. 14, 1985 and Nov. 29, 1985.

10. Dangerous Properties of Industrial Materials; N.I. Sax, Sixth Edition; 1984.

11. U.S.G.S. Topographic Map Series; Chattanooga, Tennessee (105SE) and Fort Oglethorpe, Ga-Tenn. (106NE) quadrangles.

12. 1980 Census of Population and Housing; U.S. Dept. of Commerce/Bureau of Census, 1983.

13. Neighborhood Analysis - District 2, South Center City; Chattanooga - Hamilton County Regional Planning Commission, 1974.

14. Water Quality Management Plan - Lower Tennessee River Basin; TDHE/DWQC; 1978.

15. Chattanooga Creek Survey; Tenn. Dept. of Health and Environment, 1982; Appendix 1.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ S. CAPPING/COVERING — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

None

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): D.M. Steward Manufacturing Co.

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: East side of Jerome Street between 36th and 37th Streets

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Chattanooga	TN	37401	Hamilton	033	03

09 COORDINATES: LATITUDE 35 00 03 . LONGITUDE 085 17 53 . W

10 TYPE OF OWNERSHIP (Check one): [X] A. PRIVATE [ ] B. FEDERAL [ ] C. STATE [ ] D. COUNTY [ ] E. MUNICIPAL [ ] F. OTHER [ ] G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION: 10, 17, 85 (MONTH DAY YEAR)

02 SITE STATUS: [X] ACTIVE [ ] INACTIVE

03 YEARS OF OPERATION: 1888 | present (BEGINNING YEAR / ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply): [ ] A. EPA [ ] B. EPA CONTRACTOR ______ (Name of firm) [ ] C. MUNICIPAL [ ] D. MUNICIPAL CONTRACTOR ______ (Name of firm) [X] E. STATE [ ] F. STATE CONTRACTOR ______ (Name of firm) [ ] G. OTHER ______ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
Walker Howell	Geologist 2	DSWM	(615) 741-6287

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO
Jan Eldridge	Geologist 2	DSWM	(615) 741-6287
Gordon Caruthers	Environmental Specialist	DSWM	(615) 741-6287
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
John Woody	Marketing Eng.	E. 36th St./Chattanooga	(615) 867-4100
David Holt	Plant Engineer	E. 36th St./Chattanooga	(615) 867-4100
Riley Castleberry	Maintenance Supervisor	E. 36th St./Chattanooga	(615) 867-4100
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
[X] PERMISSION [ ] WARRANT	9:15 a.m. est.	Sunny, partly cloudy, 75°F

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO
John Woody	D.M. Steward Manufacturing Co.	(615) 867-4100

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO	08 DATE
Walker F. Howell	TDH&E	DSWM	(615) 741-6287	11 1 85 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- X A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER ______ (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS ______
- CUBIC YARDS unknown
- NO. OF DRUMS ______

03 WASTE CHARACTERISTICS (Check all that apply)

- X A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- X D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	unknown	----	Heavy metals contained ceramic waste products.

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
MES	Barium Oxide	1304-28-5	LF, SI	unknown	-----
MES	Nickel	7440-02-0	LF, SI	unknown	
MES	Zinc	7440-66-6	LF, SI	unknown	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site Inspection, D.M. Steward Manfucturing Co., October 17, 1985.
Interviews with plant personnel

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE: TN
02 SITE NUMBER: D 003327251

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION
02 [X] OBSERVED (DATE: 10/17/85) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

A surface impoundment and an adjacent dump adjoin a low swampy area indicative of groundwater resurgence. A spring on the site is allegedly contaminated and discharge is pumped to city sewer.

01 [X] B. SURFACE WATER CONTAMINATION
02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

A surface impoundment lying adjacent to a wet, swampy area was used for disposal of filter waste. Ar ea drains to a tributary of Chattanooga Creek.

01 [ ] C. CONTAMINATION OF AIR
02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

N/A

01 [ ] D. FIRE/EXPLOSIVE CONDITIONS
02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

N/A

01 [X] E. DIRECT CONTACT
02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 9621
04 NARRATIVE DESCRIPTION

There are no security guards or fencing around site. The site is also bounded on three sides by residential areas. Population cited is an estimate of that within a one mile radius of the site.

01 [ ] F. CONTAMINATION OF SOIL
02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [X] ALLEGED
03 AREA POTENTIALLY AFFECTED: 0.75 (Acres)
04 NARRATIVE DESCRIPTION

Soil in the area of the old settling pond and below the toe of the landfill is contaminated with lead, nickel, copper, and zinc. Samples collected by SIU on 10/17/85 and analyzed by State DHE lab.

01 [ ] G. DRINKING WATER CONTAMINATION
02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

N/A

01 [ ] H. WORKER EXPOSURE/INJURY
02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

N/A

01 [ ] I. POPULATION EXPOSURE/INJURY
02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

N/A

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 X M. UNSTABLE CONTAINMENT OF WASTES (Spills Runoff Standing liquids, Leaking drums) — 02 X OBSERVED (DATE: ______) X POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Blue crystalline material has been observed to be on the surface of the impoundment near a spring.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: 9621

IV. COMMENTS

Saturated soil encountered 8-10 inches below surface during sampling on 10/17/85; water table apparently very shallow in this area.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site Inspection, D.M. Steward Manufacturing Co., October 17, 1985, Site Investigations Program files; TDSF central files; TDSWM central files.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFI[illegible]ION	
01 STATE	02 [illegible] NUMBER
TN	D 003327251

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
X A. NPDES				
☐ B. UIC				
X C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
X A. SURFACE IMPOUNDMENT	unknown	
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
X F. LANDFILL	unknown	
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- X C. CHEMICAL/PHYSICAL
- X D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER

X A. BUILDINGS ON SITE

06 AREA OF SITE

0.75 (Acres)

07 COMMENTS

A pond existed at one time adjacent to Jerome Street and was used as a settling basin for removal of solids from wastewater discharge. Approximately 5-10 years ago, D.M. Steward hocked into a pretreatment system which eliminated the need for this facility. The pond sits next to a low swampy area which apparently drains subsurfacely.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE X C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

No diking, liners, or barriers. Scrap ceramics, debris, etc. dumped at working face of landfill. Liquid was discharged to settling pond where s olid residue now remains layered on surface. Water ponds in area periodically in contact with waste.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE X YES ☐ NO

02 COMMENTS

The surface impoundment lies adjacent to Jerome Street and 37th St. No fencing or security onsite.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Site Inspection 10/17/85; interviews with plant personnel; TSWM central files; TDSF/SIU files; USGS topo quadrangles 105SE and 106NE.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)	SURFACE	WELL	02 STATUS: ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☒	B. ☐	A. ☐	B. ☐	C. ☐	A. ____ (mi)
NON-COMMUNITY	C. ☐	D. ☐	D. ☐	E. ☐	F. ☐	B. ____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING
☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)
☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)
☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER: None

03 DISTANCE TO NEAREST DRINKING WATER WELL: ---- (mi)

04 DEPTH TO GROUNDWATER: 0-2 (ft)

05 DIRECTION OF GROUNDWATER FLOW: S-SE

06 DEPTH TO AQUIFER OF CONCERN: ____ (ft)

07 POTENTIAL YIELD OF AQUIFER: ____ (gpd)

08 SOLE SOURCE AQUIFER: ☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

State records indicate no domestic water wells exist in immediate area.

10 RECHARGE AREA

☒ YES ☐ NO

COMMENTS: Are a around old surface impoundment is a depression which apparently drains subsurfacely.

11 DISCHARGE AREA

☒ YES ☐ NO

COMMENTS: The area has a spring which resurges here.

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE
☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES
☒ C. COMMERCIAL, INDUSTRIAL
☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Chattanooga Creek	☐	0.30 (mi)
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 9621 NO. OF PERSONS	B. ____ NO. OF PERSONS	C. ____ NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION: 0.02 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE: ____

04 DISTANCE TO NEAREST OFF-SITE BUILDING: 0.02 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The site is bounded on three sides by residential areas with approximately 9621 people within one mile of the facility. This is indicative of a fairly dense suburban area.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE *(Check one)*

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☒ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK *(Check one)*

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
5 (ft)	unknown (ft)	-------

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
14.0 (in)	3.25 (in)	0.5 %	West	1.0 %

09 FLOOD POTENTIAL
SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS *(5 acre minimum)*

ESTUARINE A. ______ (mi) OTHER B. 0.5 (mi)

12 DISTANCE TO CRITICAL HABITAT *(of endangered species)*

______ (mi)

ENDANGERED SPECIES: N/A

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. 0.05 (mi)	B. 0.02 (mi)	C. ---------- (mi)	D. ------- (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site lies in a low, swampy area bounded on its south flank by 38th Street and on its west side by Jerome Street. Apparently drainage from the swamp is subsurface. A spring resurges on site and heads up this body of water. Site is in flood plain of Chattanooga Creek. There is evidence of extensive subsurface drainage in the area. Wetland areas along nearby Chattanooga Creek are severely impacted by pollution from numerous sources. Average slope to the creek is about 1%. Site is not in a closed basin. A culvert and ditch drain to the creek during wet weather and during drier periods ponded water apparently drains underground.

VII. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

United States Dept. of Agriculture, Soil Conservation Service, Soil Survey of Hamilton County, Tennessee, May 1982. A Users Manual/Uncontrolled Hazardous Waste Ranking System, USEPA, 1984 U.S. Geological Survey, Topographic Map, Chattanooga Quadrangle (105SE), 1976, and Ft. Oglethorpe (106 NE) 1958.

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER	2	State Laboratory in Nashville, TN	12/1/85
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL	2	State Laboratory in Nashville, TN.	12/1/85
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE X GROUND ☐ AERIAL

02 IN CUSTODY OF Site Investigations Program
(Name of organization or individual)

03 MAPS X YES ☐ NO

04 LOCATION OF MAPS Division of Solid Waste Management, Nashville Central Office

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Site Inspection, D.M. Steward Manufacturing Co., October 17, 1985, Site Investigations Program

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER		
Hamilton Concrete Products			
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE		
1400 East 39th Street			
05 CITY	06 STATE	07 ZIP CODE	
Chattanooga	TN	37407	
01 NAME	02 D+B NUMBER		
(615) 867-4510			
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE		
05 CITY	06 STATE	07 ZIP CODE	
01 NAME	02 D+B NUMBER		
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE		
05 CITY	06 STATE	07 ZIP CODE	
01 NAME	02 D+B NUMBER		
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE		
05 CITY	06 STATE	07 ZIP CODE	

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P O Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P O Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P O Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P O Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

IV. REALTY OWNER(S) (If applicable, list most recent first)

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Office of Hamilton County Assessor of Property

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
D.M.. Steward Manufacturing Co	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
E. 36th St. and Jerome ST.	

05 CITY	06 STATE	07 ZIP CODE
Chattanooga	TN	37401

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Logbook of Site Inspection Activities - D.M. Steward Co. Tenn. Division of Superfund - SIU, 17 October 1985

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
D.M. Steward Mfg. Co.	

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE
E. 36th St. and Jerome	

05 CITY	06 STATE	07 ZIP CODE
Chattanooga	TN	37401

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A			

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Logbook of Site Inspection Activities - D.M. Steward Co. Tenn. Division of Superfund - SIU
17 October 1985

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ F. WASTE REPACKAGED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ H. ON SITE BURIAL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ L. ENCAPSULATION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ N. CUTOFF WALLS — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE ______ 03 AGENCY ______
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DEPARTMENT OF CONSERVATION

DIVISION OF GEOLOGY

BULLETIN 58

PART I

GROUND-WATER RESOURCES OF EAST TENNESSEE

By

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and

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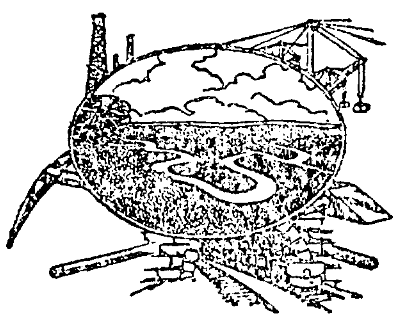

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that it is confined and under pressure, whereas in the latter it is not confined or under pressure. In the first case, the water will rise in wells above the level at which it is encountered, and it is called confined or artesian water. If the water in a well tapping an artesian aquifer rises above the surface of the ground, the well is called a flowing well. If the water is unconfined, no appreciable rise of the water takes place when a well reaches the zone of saturation, and the upper surface of the body of ground water is the water table.

Ground water is derived chiefly from rain and snow. A part of the precipitation runs off in streams, a part is returned to the atmosphere by evaporation and transpiration, and a part sinks downward to the zone of saturation and becomes ground water.

In most places ground water is slowly but steadily moving under the influence of gravity from areas of intake to areas of discharge. The rate of movement is proportional to the permeability of the water-bearing medium and the slope of the water table or artesian-pressure surface, which slope is called the hydraulic gradient.

The water levels in most wells fluctuate to a varying degree. These fluctuations are due to many different causes, but most of them are manifestations of a change in the ratio between the rate of ground-water intake or recharge and the rate of loss or discharge. Most wells that are supplied in part from intake areas close at hand respond to rainfall with only a moderate lag. In such wells, the water level may rise several feet after heavy prolonged rains and decline until the wells go dry during prolonged droughts. Fluctuations in water level are caused also by withdrawals of ground water from the well itself or from other wells, and by changes in atmospheric pressure or in the loading of the earth's crust by tides or even by railroad trains.

When a well is pumped or allowed to flow, the water level in the well drops, and a hydraulic gradient is developed toward the well from all directions. As the hydraulic gradient increases, the water flows faster toward the well. Within limits, the rate at which water will enter the well varies directly with the amount the water level is lowered. The ratio of the yield of a well to the drawdown is called the specific capacity and may be expressed as yield in gallons per minute (gpm) per foot of drawdown. For example, if the water level in a well is lowered 40 feet by pumping 40 gpm without exceeding the capacity of the formation to transmit water, the water level would be lowered about 20 feet while pumping 20 gpm. The specific capacity for such a well would be 1 gpm per foot of drawdown.

The preceeding discussion of specific capacity has been based upon the assumption that the water flows through the interstices of a porous material. In some rock formations, however, much of the flow undoubtedly takes place through fissures. This is apt to be the case with limestone strata, the passageways in this material sometimes assuming large dimensions, owing to the solvent action of the water.

The effect of these fissures is to increase greatly the capacity of the material to carry water, and, at the same time, to modify the law of flow. The flow through large fissures generally is turbulent, instead of laminar as in most granular materials, and the resistance to flow will vary approximately as the square of the velocity, instead of as the first power. As one result, the yield of a well supplied largely from fissures will not increase at the same rate as the lowering of the water in the well, but more slowly.

Withdrawals of ground water are accompanied by a general lowering of the water table or artesian pressure, a cone of depression gradually spreading in all directions from the center of pumping. The dimensions of this cone are dependent upon the permeability of the water-bearing formation and the quantity of water withdrawn.

When pumping from a well ceases, the water level in the well rises toward its original level. The rate of recovery of a given well, like its drawdown, is dependent upon the hydrologic characteristics of the aquifer, and the rate and duration of pumping. The two hydrologic characteristics that govern the rates of drawdown and recovery are the coefficient of transmissibility and the coefficient of storage. The coefficient of transmissibility, a function of permeability, is a measure of the ability of a formation to transmit water. It is expressed as the number of gallons that will move in 1 day through a section of the aquifer 1 mile wide and having a height equal to the saturated thickness of the aquifer under a hydraulic gradient of 1 foot per mile, under prevailing conditions of water temperature, density, and viscosity. The coefficient of storage, which for water-table conditions is essentially the same as the specific yield of an aquifer, is the amount of water, expressed as a fraction of a cubic foot, that is released from a vertical column of the aquifer having a height equal to the saturated thickness of the aquifer and a base of 1 square foot when the head on the aquifer is lowered 1 foot. The coefficient of storage under artesian conditions represents water squeezed out of the rock, and also a slight expansion of the water itself, as the head is lowered, rather than water drained by gravity from interstices. Thus it is much smaller—generally hundreds of times smaller—under artesian than under water-table conditions.

Water-Bearing Properties of Rocks

Rocks may be considered to have two water-bearing characteristics, storage capacity and transmission capacity. The storage capacity of a rock depends upon the number and size of the openings and the state of confinement. The transmission capacity is dependent upon the size of the openings and their degree of interconnection.

The following discussion considers these properties of the three principal rock types:

Igneous Rocks

Igneous rocks are those produced by the cooling and solidifying of molten material that has risen from depth through fissures formed in the weaker parts in the earth's crust. The portion of molten material that solidifies before reaching the earth's surface forms intrusive rocks, whereas the portion that solidifies after reaching the earth's surface forms extrusive or volcanic rocks. In addition to this classification by origin, igneous rocks are subdivided according to their texture and mineral composition.

In most igneous rocks, ground water occurs in fractures developed by the contraction of the rocks as they cooled, or by subsequent earth movements. The fractures may be isolated or may form a crisscross pattern. The size of these fractures and their degree of interconnection control the yield of wells in these rocks. Owing to the weight of the overlying rock, the fractures decrease in size and number with increasing depth, and wells in such rocks usually produce little water from depths greater than 400 or 500 feet.

Some igneous rocks contain small openings developed during the process of solidification. These small cavities produced by steam or gaseous material escaping from the cooling material are called intercrystal spaces and vesicles. Where vesicular igneous rocks are found, large-yield wells and springs are common—for example, the large springs issuing from vesicular basalt along the Snake River in Idaho. In such areas the depth and yield of wells are dependent upon the depth and thickness of the vesicular horizon, rather than the chance interception of a fracture.

As few igneous rocks are found in East Tennessee, they are of no importance as aquifers.

Metamorphic Rocks

Metamorphic rocks are formed by the alteration, due to extreme temperature and pressure, of igneous, sedimentary, or other metamorphic rocks. Different degrees of metamorphism produce different types of rock. In resistant metamorphic rocks, such as quartzite and gneiss, the amount of available water is dependent upon the size, number, and interconnection of the fractures. Quantities of water sufficient for domestic use are usually encountered in the first few hundred feet of drilling. Larger quantities of water are developed along permanent streams. Ground water occurs in marble (metamorphosed limestone) as

it does in ordinary limestone, which is discussed under sedimentary rocks.

In less resistant metamorphic rocks also, such as slates and schists, ground water occurs in fractures. These rocks frequently have a deep mantle of soil overlying them that is permeable enough to permit the downward percolation of water. Domestic water supplies usually can be derived from wells dug to the soil-bedrock contact. Where it is necessary to drill a well into the bedrock, small quantities of water are usually obtained from fractures. Wells in these rocks are usually not as deep as wells in the more resistant types of metamorphic and igneous rocks.

In East Tennessee, metamorphic rocks are restricted to the Blue Ridge province. They are of only local importance as aquifers.

Sedimentary Rocks

Sedimentary rocks are formed by the weathering of igneous, metamorphic, and other sedimentary rocks and the subsequent transportation and deposition of the weathered products. These rocks provide storage for large amounts of ground water.

Unconsolidated sediments, such as gravel, sand, silt, clay, and mixtures of these materials, vary in their water-bearing properties but on the whole include the most important aquifers in the world, though not in East Tennessee. Well-sorted gravel deposits are excellent aquifers. Wells in these deposits frequently yield water at rates of thousands of gallons per minute. Sand that is well sorted and not too fine grained also makes a good aquifer. Deposits of gravel or sand that contain much clay or silt yield little water to wells. Silt and clay are poor aquifers and generally act as confining beds rather than aquifers in series of unconsolidated rocks.

In East Tennessee, unconsolidated sediments are found principally along streams. As these deposits are usually quite thin, they are of little importance as sources of water.

Consolidated sediments, such as limestone, dolomite, shale, and sandstone, also are quite variable in their water-bearing properties. As most of East Tennessee is underlain by consolidated sedimentary rocks, they are the most important aquifers of the area.

The openings in which ground water is found in limestone and dolomite may be classified as to origin into primary and secondary types, or those formed at the time the containing rock itself was formed and those which had a later origin. Secondary openings largely control the movement of ground water in the carbonate rocks of East Tennessee. These openings, mainly fractures and openings along bedding planes, permit the entrance of chemically reactive water, which can modify profoundly the size and shape of the openings through which it passes. Because the acidity of water moving through limestone decreases as calcium carbonate is dissolved, the rate of solution decreases with depth. This results in the enlargement of fractures by solution near the surface, and, under certain conditions, in the closing of fractures by precipitation at depth.

The yield of wells in limestone is dependent upon the size and number of solution cavities encountered in drilling. It is known, from records of water wells and other borings in East Tennessee, that solution cavities containing water are present at depths of as much as 900 to 1,000 feet below the surface. However, most of such openings usually are confined to the first 350 feet. If sufficient water is not obtained in 350 feet of drilling, it generally is not advisable to drill deeper, as the chance of obtaining additional water decreases with depth.

The problem of determining the location for a well to be drilled into a limestone or dolomite then becomes one of predicting the presence of solution cavities. There is no positive way to locate these cavities except by drilling.

Many sinkholes caused by the collapse of caverns may be found in areas where extensive solution of the underlying limestone has taken place. In such areas, few surface streams are found. Most of the drainage is through a well-developed underground drainage system, and the water table is likely to be deeper than in other areas. The reason for this is that the subsurface drainage pattern is so well developed that water falling on the surface quickly percolates downward to the subsurface drainage system where it moves rapidly in solution channels laterally to points of discharge. Such systems drain the water so rapidly that little is retained in storage above the grade of the subsurface drainage. In areas where subsurface drainage is not so well developed, water is held in storage for a longer time before discharging.

There is evidence that solution has been more active near perennial streams than elsewhere. Industries close to rivers are more successful in obtaining large supplies of ground water than those in other locations. It is possible that, in some places, solution along zones of weakness in the rocks has determined the location of the stream. In any event, it is probable that in many places solution channels are connected with surface streams and that these connections allow river water to flow into wells.

Shale is formed by the compaction and consolidation of sediments composed chiefly of particles of clay or silt size. Shales have very little primary pore space, and, unless secondary openings are formed by fracturing, will yield very little water to wells. The rocks of East Tennessee have been folded and faulted extensively, hence, shales that are

hard and brittle enough to support fractures are among the better aquifers of the area.

Shales containing appreciable quantities of calcium carbonate yield more water than noncalcareous shales, as the fractures in such rock are susceptible to enlargement by the solvent action of water. In general, fractures in shale are much more closely spaced than those in limestone and dolomite. As a result, the hydrologic properties of shales are relatively uniform and practically all wells drilled in shale in East Tennessee yield water at moderate depths.

Sandstones and noncalcareous shales are composed of particles of minerals and rock more or less firmly cemented together. Rocks of these types found in East Tennessee contain practically no primary openings. Openings capable of transmitting water are secondary and consist of joints and other fractures formed after the sediments were deposited. Unlike limestone, dolomite, and calcareous shale, the openings in sandstone are not readily susceptible to enlargement by solution by water. Sandstones are not as widely distributed in East Tennessee as limestones, dolomites, and calcareous shales. However, rocks of this type, because of fracturing, will usually yield small supplies of water.

In an attempt to evaluate quantitatively the water-bearing properties of the various rock types, well data collected during the investigation were analyzed as follows:

All wells were grouped according to the geologic formation into which they were drilled. The wells in each formation were grouped according to depth. This information was plotted on coordinate paper, with cumulative frequency of occurrence as the ordinate and depth as the abscissa. It was observed that similar curves were obtained from well data for formations that were similar in their physical properties. Therefore, the wells were regrouped into three classes—calcareous shale, noncalcareous shale and sandstone, and limestone and dolomite—and reanalyzed. Data summarized from curves for these three rock types are shown in table 5.

Table 5 indicates that the chance of obtaining a domestic supply from a well within the first 100 feet is about 30 percent better in formations composed predominantly of calcareous shale than in limestone or dolomite. If a choice were to be made between a calcareous shale and a noncalcareous shale or sandstone, the chances of obtaining water in the first 100 feet are reduced to about a 5-percent difference in favor of the calcareous shale location. The curve for the noncalcareous shale-sandstone aquifers is less reliable than the curves for the other two aquifers, because fewer wells were available for analysis.

TABLE 5.—FREQUENCY DISTRIBUTION OF DEPTHS OF SUCCESSFUL WELLS IN VARIOUS TYPES OF AQUIFERS IN EAST TENNESSEE

Type of aquifer	Number of wells analyzed	Percent of wells deeper than 50 feet	Percent of wells deeper than 100 feet
Calcareous shale	1,022	50	17
Noncalcareous shale and sandstone	236	52	22
Limestone and dolomite	1,974	77	48

Type of aquifer	Percent of wells deeper than 150 feet	Percent of wells deeper than 200 feet	Percent of wells deeper than 300 feet
Calcareous shale	10	7	3
Noncalcareous shale and sandstone	12	8	4
Limestone and dolomite	29	18	9

Development and Utilization

Wells

There are four general types of wells: dug, bored, driven, and drilled. Dug wells are open holes, 24 inches or more in diameter. In areas of thick residuum these wells commonly obtain water at the residuum-bedrock contact. In valleys water may be obtained from them at relatively shallow depths; in upland areas dug wells may be more than 100 feet deep. Dug wells commonly are used for rural domestic supplies.

In alluvial deposits wells 2 or 3 inches in diameter may be bored with a hand auger. The recent development of small power augers has made it possible to bore larger wells into some consolidated rocks. Few well drillers use power augers; conventional types of well-drilling equipment are considered more satisfactory.

Driven or well-point wells are used to obtain small quantities of water at shallow depths in unconsolidated material. Such a well consists of a well point on the end of a pipe which is driven into the ground. The well point is perforated and serves as the well screen.

Drilled wells are the most common, because they can be drilled to any size and depth in either unconsolidated or consolidated material. There are three principal methods of drilling wells: percussion drilling, rotary drilling, and jetting.

The percussion drilling machine or rig is frequently called the cable-tool, churn, or solid-tool rig. In this method of drilling, a string of tools which may weigh a thousand pounds or more is suspended by a cable or rope and raised and dropped to produce a cutting or drilling action at the bottom of the hole. The loose material is removed by a bucket having a flap valve in the bottom, which is lowered into the hole. It is frequently necessary to drive casing after drilling 5 or 10 feet in unconsolidated material to prevent the hole from collapsing. In harder rocks casing generally is not used except between the surface and bedrock, or in zones of caving rocks or poor-quality water.

Rotary drilling rigs are used in both consolidated and unconsolidated formations. The drilling equipment consists of a string of hollow steel rods upon the end of which is a cutting bit. The bit may be any one of several types, depending on the material to be drilled. With the weight of the rods bearing on the bit, the rods are rotated by mechanical means and water or drilling mud is forced down through the open drill stem and discharged at the end of the bit. The fluid then rises to the surface between the outside of the drill stem and the inside of the well carrying small particles of drilled material with it. In unconsolidated material, a drilling mud is used instead of water to keep the hydraulic pressure in the open hole great enough to prevent the sides from caving. Rotary drilling of water wells is done chiefly in areas underlain by unconsolidated rock. In consolidated rock the cable-tool rig is preferred.

Jetting rigs use the same hydraulic circulating principle as rotary rigs. The method of drilling differs, in that the rotary rigs have mechanical means to rotate the bit and drill stem. The jetting rig uses a similar string of tools, but the tools and bit are moved back and forth by hand. The tools are also moved up and down by machine to enable the bit to cut new material. These rigs are used only in unconsolidated material.

Many wells, after being put down, are "developed" to increase their yield. Although development work is usually restricted to wells drilled in unconsolidated rocks, some work has been done on developing rock wells. Carr (1942) describes methods for developing wells drilled in shale which increased yields as much as 100 percent. The walls of wells were cleaned by vigorous scrubbing with wire brushes, which effectively removed particles of shale that had prevented free entry of water. Although these methods have not been used in East Tennessee, such treatment might improve the yield of many wells in shale.

One of the most common methods used in developing wells employs compressed air. Development by air consists of intermittently releasing large volumes of compressed air into the well to produce a surging action. The surging causes a change in pressure on the sides of the well.

Openings that have become blocked by particles plastered on the sides of the well by the action of drilling tools frequently are removed by the surging. The sand and clay that are frequently found in solution cavities in limestone may also be removed by this method.

Another common method of surging wells is by use of a surge plunger, a loosely fitting piston attached to a drill stem, which is raised and lowered in the hole by means of the drilling action of the rig.

Turbine pumps also can be used to develop wells. The well is pumped intermittently, causing a surging effect which removes shale particles or other fine material clogging the openings.

Attempts are sometimes made to develop rock wells by means of explosives. This method is highly effective and commonly used in a few places, and in East Tennessee it has been found to increase the yield of a well only rarely.

In the oil industry, and to a lesser extent in the water well industry (Anderson, 1946), wells in limestone have been treated with acid to increase their yields by enlarging the openings in the rock. Acid is forced into the well and allowed to react with the limestone. It frequently contains an inhibitor to prevent its acting on the well casing and pump. Varying degrees of success have been obtained, but expensive equipment and trained personnel are required to acidize a well properly.

Springs

Springs are one of the major natural means of ground-water discharge. Meinzer (1923b) has discussed the various characteristics by which springs may be classified. In his report springs are classified on the basis of the character of the openings from which the water emerges, the rock structure, and the forces that bring the water to the surface.

With respect to the character of openings through which the water issues, there are three classes of springs—seepage or filtration springs, fracture springs, and tubular springs. All these different types of springs grade into one another.

A seepage spring, or filtration spring, is one whose water percolates from numerous small openings. Many of these springs have a very small discharge. The term seepage spring is often limited to springs of small discharge; the term filtration spring may be applied without limitation as to yield.

In fracture and tubular springs, the water flows from relatively large openings in the rocks. The term fracture spring is used where the opening or openings consist of joints or other fractures. The term tubular springs is used where the opening or openings consist of more or less rounded channels, such as solution passages in limestone.

With respect to the rock structure and the forces that bring the water to the surface, springs may be divided into two classes—gravity springs and artesian springs. Gravity springs are divided into depression springs and contact springs. A depression spring is one whose water flows to the surface from permeable material because the land surface extends to or below the water table. A contact spring is one whose water flows to the surface at the contact of two materials of different permeabilities. An artesian spring is one whose water issues under pressure through some opening in the confining bed that overlies the aquifer.

The way in which a spring can be developed depends upon its type. The only development that can be made of fracture or tubular springs is the construction of a sanitary reservoir to catch and hold the discharging water. The yield of seepage springs can frequently be concentrated and increased by constructing infiltration galleries along the lines of spring discharge. In either case, the most important considerations are the construction of sanitary reservoirs at the point of spring discharge and the exclusion of polluted surface water from the reservoir.

Chemical Quality

No natural water is chemically pure. Rainwater falling through the atmosphere dissolves gases, such as carbon dioxide, and mineral substances, such as sodium chloride from salt spray. However, the amount of inorganic material dissolved is usually very small.

When rainwater with its slight mineral content reaches the ground, it immediately begins to attack the rocks upon which it falls. The length of time that water is in contact with the rocks, its temperature, and its pressure are factors in the solvent action of water. The absorption of carbonic acid by water, both while it is falling through the air and while it is passing thorugh humus and the upper layer of soil, greatly increases the water's ability to dissolve rocks.

Chemical analyses of water are made to determine the character and amount of mineral matter that the water contains. Ordinarily, a water analysis is a statement of the amounts of silica, iron, calcium, magnesium, sodium, potassium, bicarbonate, carbonate, sulfate, chloride, nitrate, and, often fluoride in the water, as well as its pH, hardness, and specific conductance. The amounts are usually expressed in parts per million (ppm), except the specific conductance, which is expressed in micromhos at 25°C., and the pH, which is the logarithm of the reciprocal of the hydrogen-ion concentration.

Chemical analyses were made by the U. S. Geological Survey of 312 water samples collected from wells and springs in East Tennessee. These data are listed in the sections on the individual counties. The general location of each source is given in the well and spring tables, and a more exact location is shown by symbol and number on one of the 14 plates included with this report.

Iron

Iron in small amounts is present in most natural water and some water contaminated by industrial waste may carry considerable quantities. One-half ppm is detectable by taste. Water containing more than 0.3 ppm will stain fixtures, utensils, and fabrics.

Water having a high iron content favors the growth of the organism *Crenothrix*. This organism forms reddish-brown growths that are deposited in water pipes, partially clogging them or completely stopping the flow of water.

Calcium

Calcium is one of the soap-consuming elements in water and the principal scale-forming constituent. In carbonate water calcium forms a soft scale in boilers or cooking utensils. The addition of lime to these waters may partially remedy this situation. In sulfate and carbonate sulfate water calcium forms a hard scale. The addition of soda ash to such waters will reduce the calcium content. Carbonate and sulfate water containing calcium are sometimes treated in a preheater to remove the calcium. The heating of carbonate water results in the precipitation of calcium carbonate, because the carbonic acid, which holds the calcium in solution, is volatilized; calcium sulfate is precipitated when sulfate water is heated because its solubility decreases with increase in temperature.

Magnesium

Magnesium is generally present in water that contains calcium but usually in smaller quantities than the calcium. Magnesium carbonate, which is precipitated by raising the water temperature, forms a soft scale. Sulfate water containing calcium and magnesium forms a dense, porcelain-like scale which contrasts with the friable scale formed by calcium or magnesium carbonate. The other salts of magnesium are soluble and do not form scale.

Sodium and Potassium

In many analyses, sodium and potassium are not reported separately because the amount of potassium is small. Carbonate and sulfate water carrying large amounts of sodium and potassium may cause foaming in boilers.

Carbonate and Bicarbonate

Carbonate is not present in appreciable amounts in most natural water. The carbonate is held in solution as bicarbonate through the action of carbon dioxide. Water that comes from relatively insoluble rocks may contain less than 10 ppm of bicarbonate. Water from limestone or dolomite frequently contains 100 to 500 ppm of bicarbonate, although some limestone water may contain much less. Calcium and magnesium bicarbonates make up the greater part of the dissolved mineral matter in many natural waters. Bicarbonate has comparatively little effect upon the domestic use of a water.

Sulfate

Sulfate is derived from various sources in the soil and rock, and from material added by human agencies—from gypsum, from oxidation of metallic sulfides or sulfur-bearing organic compounds, or from fertilizers containing sulfate. Some sulfate in municipal water supplies is derived from the aluminum sulfate used in treating the water. In mines, where pyrite (iron sulfide) is exposed to the action of air and water, the oxidation of sulfide and the formation of sulfuric acid is so extensive that serious damage to mining equipment and pollution of streams into which the mine drains may result. Sulfate causes a bitter taste in water if it is present in excessive quantities.

Chloride

Chloride is dissolved in small quantities from rock materials. Sodium chloride is a characteristic constituent of sewage, and any appreciable pollution of water by sewage is accompanied by a measurable increase in chloride. Chloride gives a salty taste to water if present in quantities greater than a few hundred parts per million.

Nitrate

Nitrate is usually derived from the soil. Certain fertilizers in the soil may contribute to the nitrate content in water supplies. The nitrate in most water is considered to be the oxidation product of nitrogenous organic material. The presence of abnormal quantities of nitrate is frequently considered to represent a poor sanitary condition. The quantity of nitrate usually found in water has no effect upon the water for ordinary uses, but high contents may be dangerous to the health of infants.

pH

The pH of water is an expression of its acidity or alkalinity. The pH is the logarithm of the reciprocal of the hydrogen-ion concentration. Thus a low value for pH is evidence of a high concentration of hydrogen ions, or acidity, and a high pH is evidence of a low concentration of hydrogen ions, or alkalinity. Neutral water has a pH of 7.0.

Hardness

Hardness is a characteristic of water that receives considerable attention with reference to domestic and industrial use. Hardness is caused almost entirely by calcium and magnesium. Other constituents, such as iron, aluminum, strontium, barium, zinc, or free acid also cause hardness. Carbonate and noncarbonate hardness are roughly equivalent to "temporary" and "permanent" hardness. Carbonate hardness, removable by boiling the water, refers to the hardness in equivalence with carbonate and bicarbonate; noncarbonate hardness, to the remainder of the hardness which cannot be removed by boiling. Total hardness, or just hardness, is the sum of carbonate and noncarbonate hardness.

Specific Conductance

Specific conductance, expressed in micromhos at 25°C., is a measure of the ability of a water to conduct a current of electricity. This factor varies with the concentration and degree of ionization of the different minerals in solution and with the temperature of the water.

ROCK UNITS AND THEIR WATER-BEARING CHARACTERISTICS

The rock units that underlie East Tennessee are listed in the generalized section on pages 11-14. The areal extent of the various formations is shown on plates 1 to 14. These rocks are described in detail by Rodgers in part II of this report. Their water-bearing characteristics are considered in the following pages.

Pre-Cambrian Rocks

Crystalline Complex

The pre-Cambrian rocks consist of gneiss and schist, partly formed from rocks of volcanic origin, which occur as stringers or lenses in granitic rocks. The rocks weather variably; in some places they form cliffs and in others they are covered with decomposed rock and fairly thick soil.

Ground water occurs in fractures in these rocks. Large yields from wells should not be expected. In the four water samples collected from these rocks, the mineral content was low and the hardness ranged from 9 to 57 ppm.

Pre-Cambrian(?) Rocks

Mount Rogers Volcanic Group

The Mount Rogers volcanic group crops out only in the northeast corner of East Tennessee. It consists of purplish and greenish metavolcanic rocks, chiefly metarhyolite formed from both tuffs and flows. Interbedded in the rocks are layers of conglomerate, graywacke, and nonvolcanic silty shale or slate.

Water in these rocks occurs in fractures. The limited outcrops and rugged topography make these rocks unimportant as aquifers. No water samples were collected from them.

Ocoee Series

The Ocoee series is a body of sedimentary rock several miles thick. These rocks occur in the Great Smoky Mountains and other ranges along the North Carolina-Tennessee boundary. The Ocoee series has been divided into the following units: Lowest part of Ocoee series, Great Smoky conglomerate, Nantahala slate, Snowbird formation, Pigeon siltstone, and Sandsuck shale.

The lowest rocks of the Ocoee are of undetermined thickness. The rocks contain all the types described under the Sandsuck shale and Pigeon siltstone. Siltstones and silty shales are most common.

The Great Smoky conglomerate is at least 2,000 feet thick and consists of fine- to medium-grained graywacke sandstone and dark slate. Locally, conglomerates are important members, but generally they are rare.

The Nantahala slate consists of about 2,000 feet of dark-gray to black slate and siltstone. Beds consisting of lenses of graywacke sandstone and conglomerate occur locally. Thin beds of dolomite have been reported.

The Snowbird formation is the probable equivalent of the Pigeon siltstone. It consists of sandstone, shale, siltstone, and arkose.

The Pigeon siltstone consists of about 15,000 feet of uniform, massive dark-green siltstone. Slightly coarser beds of fine-grained sandstone are common in the lower part of the formation. The lower third or half of the formation is more quartzitic.

The Sandsuck shale consists of 500 to 4,000 feet of dark silty to argillaceous shale, usually showing slaty cleavage. Lenses of dark feldspathic conglomerate are interbedded in the shale. Also interbedded are lenses of dark blue-gray silty or sandy dolomite and limestone.

The occurrence of water in rocks of the Ocoee series is restricted to fractures formed by joints and cleavage. The yields of wells and springs are small, but domestic supplies can be obtained at most locations. Twenty-seven springs issuing from these rocks were scheduled, only one of which had a yield estimated at more than 100 gpm. Most of the wells scheduled were dug wells that obtain water at the residuum-bedrock contact. The amount of ground water developed from these rocks is small, as the rugged topography is suitable only for recreational developments.

Eleven water samples from these rocks were analyzed. The hardness of water from the Pigeon slate and the rocks of the lowest Ocoee was greater than 100 ppm, whereas the hardness of water from the Sandsuck shale and Great Smoky conglomerate was less than 80 ppm.

Cambrian System

Lower Cambrian Series

Chilhowee group

The Chilhowee group overlies the Ocoee series and Mount Rogers volcanic group, or the crystalline complex where the Ocoee series is absent. These rocks form the first mountains east of the Valley and Ridge province in East Tennessee.

Unicoi formation and Cochran conglomerate.—The Unicoi formation and the Cochran conglomerate are the lowest units of the Chilhowee group. These formations are of the same age and are similar in composition, though the Unicoi is more heterogeneous. They consist of 1,000 to 5,000 feet of coarse feldspathic sandstone and fine conglomerate cemented by vitreous quartz. A few thin beds of red and purple shale and siltstone are found in the lower parts of both formations. The upper parts of the formations are dominantly coarse sandstones. The sandstones are resistant to weathering and form ridges; the more shaly lower parts of the formations weather more deeply and are mantled by talus material from nearby ridges.

Ground water occurs in fractures in these rocks. Of six springs scheduled, only one had a yield estimated to be more than 100 gpm.

Two water samples were collected from the Unicoi formation. Analyses indicate that the chemical quality of the water is good. Hardness is less than 70 ppm.

Hampton formation and Nichols shale.—The Hampton formation and the Nichols shale are time equivalents representing two different depositional environments. The Hampton formation consists of 500 to 2,500 feet of dark silty and sandy shales and beds of thick sandstone. The shales are laminated and contain abundant detrital mica. The sandstones are normally medium grained, but some are coarse grained or are conglomeratic. The Nichols shale ranges in thickness from 800 to 1,000 feet and consists largely of laminated dark silty, sandy, or clayey shale containing flakes of detrital mica. Lenses of sandstone are present in the Nichols shale but are relatively thin. The shale of both formations weathers deeply and produces a soil full of shale chips. The sandstones are more resistant and commonly form mountain crests.

Ground water occurs in fractures in the sandstone and shale. The sandstones generally are so tightly cemented with siliceous material that the beds have no primary porosity. The yields from these formations are usually low. No industrial water supplies are known to have been developed from them. Of three springs scheduled in these formations, only one had a yield of more than 10 gpm.

No water samples were collected from these rocks.

Erwin formation and equivalent rocks.—The Erwin formation and its equivalents, the Hesse sandstone, Murray shale, and Nebo sandstone, consist of about 1,000 to 1,500 feet of thick beds of white quartz-cemented sandstone interbedded with bodies of dark-green silty, sandy, or clayey shale mixed with very fine sandstone and siltstone. The sandstone beds are usually composed of well-rounded, medium-sized grains, although the grains may range in size from very fine sand to small pebbles. The quartzitic beds of this formation are resistant to weathering and form no soil. Blocks of sandstones are found on the sides and at the foot of ridges formed by these members. The interbedded shales and siltstones are less resistant to weathering and produce a thin soil full of shale chips.

The tight siliceous cement that binds the sand grains in these rocks does not allow ground water to move between them. Ground water is therefore restricted to fractures in the rocks. Eight springs were scheduled in the Erwin formation and its equivalents, two of which had yields estimated to be more than 100 gpm. Five of these springs flowed less than 10 gpm. Few wells have been drilled in these rocks because of the rugged topography.

No water samples were collected from these rocks.

Shady dolomite

The Shady dolomite consists of about 1,000 feet of white pure dolomite and blue-gray silty dolomite. Limestone occurs in the lower part and a few sandy beds are found close to the base of the formation. A thin, persistent layer of argillaceous, shaly dolomite appears in the upper part. Chert is found throughout the formation but is most common in the upper part. The Shady dolomite weathers to a deep-yellow clay low in silt; the clay overlying the dolomite grades into a red-brown soil. Masses of jasperoid and nodules of iron and manganese oxide are common in the yellow clay.

Ground water occurs in fractures in the dolomite and limestone. Three of nine springs scheduled in this formation had an estimated yield of more than 450 gpm (1 cubic foot per second). Three other springs had flows of more than 100 gpm. Domestic wells in these rocks are usually more than 100 feet deep.

Water analyses were made on several samples from this formation. The hardness ranged from 16 to 170 ppm. Water from the Shady dolomite is slightly better in chemical quality than water from some of the other dolomite formations of East Tennessee.

Rome formation

The Rome formation consists of more than 200 feet of sandstone, siltstone, shale, dolomite, and limestone. In the northwest, shale, siltstone, and sandstone predominate. In the southeast, dolomite makes up half the formation. The color of the formation varies. Red, maroon, olive-green, light-green, purple, brown, orange, yellow, and dark-gray rocks are found. The sandstone and siltstone beds weather to a shallow residual soil full of shale chips. The carbonate members weather more deeply and form yellow silty clay residuum and a red-brown soil.

Ground water occurs in fractures in the shale and sandstone and in solution channels in the dolomite. Thirty-four springs were scheduled in this formation, 20 of which had yields of less than 10 gpm. Three of the springs had yields estimated to be more than 450 gpm. Six springs had yields estimated to be between 100 and 450 gpm and five had yields estimated to be between 10 and 100 gpm. Wells are not common in the Rome formation. Dug wells in the shale members of this formation are usually about 25 feet deep. The water level in these wells fluctuates rapidly with precipitation. The formation is a poor aquifer. No industrial supplies are developed from it.

The quality of water from the Rome formation is satisfactory for most uses. The hardness of nine samples of water ranged from 7 to 186 ppm. The low values were for water in the noncalcareous shales and the high values were for water in the calcareous phases of the formation. One sample had an iron content of 9.5 ppm and one had 1.2 ppm, but the others contained less than 0.7 ppm.

Middle and Upper Cambrian Series

Conasauga shale or Conasauga group

The Conasauga shale or Conasauga group consists of three phases. The northwestern phase is composed largely of shale; the central phase is composed of alternating shale and limestone, and the southeastern phase, principally of dolomite but with some limestone and shale.

The Conasauga shale is estimated to be about 2,000 feet thick. It has been so crumpled by folding that its true thickness is unknown. It consists of light-green, olive-green, and dull-purple shale and layers and lenses of limestone. The basal part of the formation contains no limestone and the shale is interbedded with siltstone. The Conasauga shale weathers to a thin acid soil with shale chips, except where limestone is present. The limestone produces a somewhat deeper, richer soil.

Sufficient water for a domestic supply is usually obtained from wells 60 feet deep or less in the Conasauga group. Although the residuum overlying this group is not thick, dug wells are common as the highly fractured shale is easy to dig. Such wells, when dug in topographic lows, usually encounter water in the first 20 feet. Water levels in the Conasauga fluctuate rapidly with rainfall. Numerous industrial supplies are obtained from the upper part of this group. Wells that yield as much as 200 gpm are not uncommon, but they are usually located close to permanent streams or encounter solution cavities developed in limestone lenses in the shale. The occurrence of water in small fractures in the folded shale, which fractures become tighter with increasing depth, makes the drilling of wells deeper than 250 feet inadvisable.

Ground water in the Conasauga shale is restricted to small fractures. The shale has been so deformed by folding that the fractures form an interconnected network. Limestone lenses and layers often act as impervious zones which stop the downward percolation of water. Where limestone lenses are exposed, they commonly form spring horizons. These limestone-shale contacts yield water to many wells.

Sixty-five springs in the Conasauga group were scheduled in this investigation. Of these all but 15 were estimated to yield more than 10 gpm. Twenty-nine springs had yields estimated at more than 450 gpm. Most of the large springs are in the upper part of the Conasauga. The lower part of the group contains less limestone and more siltstone and is a poorer aquifer.

Water from the Conasauga is generally good. The hardness of water samples collected ranges from 6 to 266 ppm. The hardness of the water apparently is related to the amount of limestone in the shale.

Pumpkin Valley shale.—The Pumpkin Valley shale consists of 200 to 400 feet of dull-olive and purple shale and thin beds of siltstone. Shale of the same type is found in other parts of the Conasauga group but is interbedded with greener shale.

This formation is one of the poorest aquifers in East Tennessee. The shale despite being fractured is almost impervious. Only six springs in this formation were scheduled; all had yields estimated to be less than 10 gpm. Domestic wells in this formation were reported to yield only small quantities of water.

The hardness of three samples of water was 184, 203, and 240 ppm. The iron content of two of these samples was more than 1.4 ppm.

Honaker dolomite.—The southeastern phase of the Conasauga group is represented by the Honaker dolomite, which consists of about 1,300 feet of light and dark, fine- and coarse-grained shaly and massive dolomite and interbedded limestone. The lowest portion of the formation is very shaly and grades into the red shale and siltstone of the underlying Rome formation. The formation weathers to form a deep clay soil. Chert is common in the residuum derived from the lower portion of the formation but is almost nonexistent in the residuum from the upper portion.

Ground water occurs in fractures. In many places the formation has been severely crumpled by movement along faults. Nineteen springs in this formation were scheduled; five of these were estimated to flow more than 450 gpm. Only two of the springs had discharges of less than 10 gpm. Most wells drilled in this formation for domestic supplies are more than 100 feet deep. Probably the largest single ground-water development in East Tennessee is near Elizabethton, where pumpage from the Honaker dolomite was about 10 million gallons of water a day during 1947. The water is obtained from nine wells, one of which is pumped at the rate of 2,500 gpm. The wells are close to the Watauga River, which apparently recharges the formation.

The chemical quality of water from the Honaker dolomite is relatively good. Analyses of water samples collected from 11 locations indicate that the hardness ranges from 16 to 326 ppm.

Rutledge limestone.—The Rutledge limestone consists of 100 to 500 feet of blue massive limestone containing thin layers of silty and dolomitic material. A dark crystalline dolomite usually replaces the limestone at the top of the formation. The limestone and dolomite weather to produce an orange-red to red fairly deep soil which contains no chert.

Ground water is restricted to fractures in the rocks. No springs in this formation were scheduled but some undoubtedly exist. Most domestic wells are deeper than 100 feet. No industrial water supplies are known to have been developed.

No water samples were collected from this formation. It is probable that water would be similar in quality to water from other limestones in the Conasauga group.

Rogersville shale.—The Rogersville shale consists of light-green, olive green, and purple shale up to 250 feet thick. This formation is not present in all parts of East Tennessee; it is restricted to parts of the central phase of the Conasauga group. Near the top of the formation a limestone is usually found. The Rogersville shale weathers to a thin acid soil containing shale chips. The bright-green color of the weathered shale is characteristic of the formation.

Ground water occurs in fractures in the shale. The high clay content of the shale prevents it from being a productive aquifer. Only one spring, which had a yield of less than 100 gpm, was scheduled. Domestic wells derive water from these rocks, but no large-yield wells are known.

An analysis of one water sample from this formation showed a hardness of 259 ppm.

Maryville limestone.—The Maryville limestone consists of 250 to 650 feet of massive blue limestone and irregular layers of silty dolomite. Locally, the base of the Maryville limestone is a dark crystalline dolomite. The limestone of the formation becomes more silty near the top. The formation weathers to a red or orange-red soil free of chert.

Ground water occurs in fractures and along bedding planes in the limestone. Four springs in this formation that were scheduled had yields estimated to exceed 10 gpm, but only one was estimated to yield more than 450 gpm. Wells drilled for domestic supplies usually exceed 100 feet in depth. No large-yield wells are known.

The analysis of one water sample collected from this formation indicates that the water is of good quality. The hardness was 105 ppm.

Nolichucky shale.—The Nolichucky shale, 400 to 750 feet thick, consists of light-green, olive-green, and purple shale. Locally, lenses and beds of limestone occur. The purple shale contains more silt than the green shale. The formation weathers to a thin acid soil full of shale chips.

The one water sample collected from the Nolichucky shale was of good quality and had a hardness of 123 ppm.

Maynardville limestone member.—The Maynardville limestone member of the Nolichucky shale consists of 150 to 350 feet of massive blue limestone, with thin irregular layers of silty dolomite. Interbedded in the limestone are layers of oolitic limestone and some edgewise conglomerate. The member weathers to a deep orange-red or red chert-free soil.

The occurrence of water in these rocks is restricted to solution channels developed along fractures and bedding planes. Three of five scheduled springs from this member were estimated to have yields of more than 450 gpm. Springs generally appear at the base of the Maynardville limestone member, indicating that the part of the Nolichucky shale below is less permeable. Domestic water supplies from wells in this member are usually obtained in the first 150 feet of drilling. Wells of moderately large yield are developed from the lower portion of this member where it lies within 300 feet of the surface.

An analysis of water from one spring issuing from the Maynardville indicates that the water is of good chemical quality. The hardness was 105 ppm.

Cambrian and Ordovician Systems

Upper Cambrian and Lower Ordovician Series

Knox dolomite or Knox group

The Knox dolomite or Knox group, which underlies more of East Tennessee than any other similar unit, is the most important aquifer in the area. This unit changes from a cherty dolomite in the northwest side of the valley to an essentially chert-free limestone in the southeast side of the valley. Detailed geologic work on the dolomitic phases of the Knox has resulted in its subdivision into numerous formations (table 4). Where such work has been done the Knox is considered a group; elsewhere it is considered a formation.

The Knox, where undivided, consists of 2,500 to 3,500 feet of thick-bedded siliceous dolomite and interbedded limestone. A quartz-sandstone zone about 700 feet above the base of the formation is the boundary between Cambrian and Ordovician rocks in the Knox. The Knox weathers to produce a thick residual clay which commonly accumulates to thickness of more than 100 feet. Chert in the dolomite is resistant to weathering and is scattered through and over the clay residuum. The soil overlying the Knox is generally good.

The occurrence of water in the Knox dolomite is controlled by fractures that are usually enlarged by solution. The Knox is one of the most competent strata in East Tennessee and has been fractured as a result of folding and faulting. The fracture pattern of joints is usually hidden by the deep residuum overlying the formation and cannot be used as a guide in locating well sites. However, general areas that contain more fractures due to greater crustal deformation can be delineated. The yield of wells in such areas is usually large. Generally, the largest fractures are found in the first few hundred feet of drilling. Attempts to obtain larger yields by drilling excessively deep wells have usually been unsuccessful. Where wells have penetrated major thrust faults in the Knox dolomite at depths greater than 350 feet, the fault zones have been tightly cemented by secondary calcite, and little water has been obtained.

During field investigations in East Tennessee 416 springs issuing from the Knox dolomite were inventoried. Of these, 86 were estimated to yield more than 450 gpm and 82 were estimated to yield between 100 and 450 gpm. The relatively high yield of these springs and their wide geographic distribution indicate that the Knox dolomite is a good aquifer.

The yields of wells in this formation are unpredictable, as they are in many aquifers consisting of carbonate rocks. Dry wells are not unknown but are less common than wells that yield more than 100 gpm. Many industrial wells in the Knox, yielding several hundred gallons per minute, are located near permanent streams. In such locations, the temperature and chemical quality of the water indicate that many of these wells obtain water from the streams. Even in favorable locations, wells have low yields if the rocks are not fractured.

In areas characterized by many sinkholes and few surface streams, wells are generally deep. The well-developed solution pattern that drains these areas is nearly everywhere more than 100 feet below the land surface, and many domestic wells are more than 300 feet deep. In such areas, many of the inhabitants use cisterns.

The deep clay residuum overlying the Knox dolomite supplies water to many domestic dug wells. Chert in the residuum, which often accumulates in definite zones and layers, forms permeable zones. If no chert is encountered when a well is dug, the well is extended down to bedrock, where water is almost always found. In the fall, many of these wells go dry. The rapid rise of water in wells shortly after a heavy rain indicates that the recharge area of the aquifer is close by.

The quality of water from wells and springs in the Knox dolomite is similar to that from other carbonate aquifers. The hardness, which is usually the most objectionable characteristic, ranges from about 50 to 250 ppm. The hardness of water varies with the seasons. In late summer and fall, when ground-water recharge is low, the water contains more dissolved solids than in wet weather, when ground-water recharge is high. Water from the residuum overlying the Knox is softer than water from the bedrock and generally has a pH of less than 7.

Copper Ridge dolomite.—The Copper Ridge dolomite consists of 900 to 1,100 feet of dark crystalline, knotty dolomite interbedded with light-gray fine-grained dolomite. Asphaltic material accounts for the dark color. Limestone beds are virtually unknown, except near rocks of the Conococheague limestone to the southeast. Layers of dolomitic sandstone occur near the top and, locally in the east, near the base, but rarely in the rest of the formation. Dark chert nodules and thin layers of oolitic chert are common. Thicker layers of light-colored oolitic chert are diagnostic of the upper portion of the formation. Weathering produces a reddish-orange to dark-red clay residuum that contains much dark jagged, rough chert.

Ground water in this formation is restricted to fractures and bedding-plane openings. Sixteen of 94 springs scheduled in this formation had yields estimated at more than 450 gpm. Sixty-four springs had yields estimated at more than 10 gpm. The yields of wells in this formation are dependent upon the size and number of fractures encountered in drilling. Many domestic wells and a few low-yield industrial wells obtain water from this formation.

Hardness ranged from 24 to 396 ppm in water samples collected from 14 locations in the Copper Ridge dolomite. Most of the samples, however, had a hardness of less than 180 ppm. The water sample having a hardness of 24 ppm was from a dug well.

Conococheague limestone.—The Conococheague limestone is the eastern equivalent of the Copper Ridge dolomite. This formation is about 1,100 feet thick and consists of dark-blue-weathering limestone and thin layers of silty light-gray dolomite. Beds of crossbedded coarse-grained sandstone are found near the top and base of the formation. Dark chert nodules occur in the limestone but are more apparent in the residuum overlying the formation along with light-colored angular chert. Blocks of sandstone are found in the residuum overlying the sandstone beds. The clay residuum grades upward to a deep orange-red to dark-red soil.

Fractures control the occurrence of ground water in this formation. Only six springs were scheduled, none of which had yields estimated at more than 100 gpm. Five, however, had yields estimated at more than 10 gpm. The aquifer supplies many domestic and a few industrial wells.

Chepultepec dolomite.—The Chepultepec dolomite consists of 700 to 750 feet of light-colored well-bedded fine- to medium-grained dolomite including occasional layers of silty dolomite and dark dolomite. Sand-

stone layers up to 10 feet thick are usually found in the lower third of the formation. Chert nodules are common in the dolomite, especially in certain layers. Weathering of the formation produces a clay containing a porous, locally massive, light-colored and fine-grained chert of dull luster. The weathering of the basal sand members produces blocks of sandstone.

Ground water occurs in fractures in the Chepultepec dolomite and in the thicker sandstone layers in the lower third of the formation. These sandstones produce some water, but only domestic and small industrial water supplies can be developed from them. Of 30 springs scheduled in the Chepultepec dolomite, only two had discharges that were estimated in excess of 450 gpm. Twenty-three of the springs were estimated to flow less than 100 gpm. Wells drilled in this formation generally yield water supplies adequate for domestic use. Yields in excess of 100 gpm are not common.

Three water samples were collected from the Chepultepec dolomite. The hardness of these samples was 88, 103, and 151 ppm. As in waters from other formations of the Knox group, hardness is the most undesirable characteristic.

Longview dolomite.—The Longview dolomite consists of about 250 feet of well-bedded, fine- to medium-grained dolomite. In the upper half of the formation the dolomite is commonly interbedded with a light-gray to brown fine-grained limestone. Sand is common as isolated grains in some beds and, locally, forms beds a few inches thick. Weathering of the siliceous beds in the Longview dolomite produces large blocks of light-colored massive fine-grained chert that are rarely porous. This chert, which occurs in the soil and clay of the weathered Longview dolomite, is diagnostic of the formation.

As in the other formations of the Knox group, ground water occurs in fractures in the moderately soluble dolomite. Analyses were made of six samples of ground water from the Longview dolomite, which indicated a hardness of 20 to 199 ppm.

Kingsport formation.—The Kingsport formation, which lies immediately above the Longview dolomite, consists of about 200 feet of massive light-colored dolomite. Parts of the formation are slightly darker, coarser, and better bedded. Near the base is usually found about 50 feet of light-gray to brown limestone containing little dolomite except where the limestone has been altered to dolomite since deposition. The Kingsport formation weathers to form a light-tan to dark-orange residual clay containing chert. The clay grades upward to a thick cherty soil. The weathered chert is blocky and white but is usually iron stained and appears porous.

The thinness of the Kingsport, which has a narrow outcrop belt because the beds dip steeply, prevents it from being an important aquifer. As in other carbonate rocks, water occurs in fractures. During field investigations eight springs from this formation were scheduled. Of these, two were estimated to yield more than 450 gpm. The wells scheduled were all domestic, but it may be possible to develop small industrial or municipal supplies from these rocks. Wells for industrial or municipal supplies should be located as near as practicable to permanent streams. Most wells in the Kingsport formation have to be drilled deeper than 100 feet to obtain a supply. As the size and number of fractures decrease with depth, it is usually not advisable to drill deeper than 350 feet.

Analyses of four water samples collected from the Kingsport formation indicate that the water is of good quality except for hardness. The hardness ranged from 102 to 198 ppm.

Mascot dolomite.—Where the Knox group is fully subdivided, the Mascot dolomite is the uppermost formation. The Mascot consists of 400 to 800 feet of well-bedded light-gray dolomite. The lower portion of the formation is somewhat darker in color and coarser in texture than the upper portion. Thin beds of gray limestone, which weathers blue, are quite common in the southeastern outcrops, whereas in the northwestern outcrops they occur only locally. The upper part of the formation is usually more siliceous than the lower part, but in places the lower part also is very siliceous. The Mascot dolomite weathers to a residual clay that grades upward to a light-tan to dark-orange soil. The chert produced by weathering of the siliceous members accumulates in the clay and in the surface soil. This accumulation of chert retards erosion and accounts for the scarcity of outcrops.

Ground water occurs in fractures in these rocks. Of 37 springs inventoried that issued from the Mascot dolomite, 11 had yields estimated in excess of 450 gpm. Only 10 of the springs yielded less than 10 gpm. Wells are successful only if fractures are encountered. Domestic wells usually must be drilled deeper than 100 feet to obtain an adequate water supply, but drilling deeper than 350 feet generally is not worthwhile.

In chemical analyses of four water samples collected from sources in the Mascot dolomite the hardness ranged from 101 to 280 ppm.

Newala formation.—In areas where the Kingsport formation and the Mascot dolomite have not been divided, the name Newala formation is applied to these rocks. This formation has been described as that portion of the Knox dolomite overlying the Longview dolomite. It weathers to produce a clay soil containing massive chert.

The occurrence and chemical quality of ground water in this formation are similar to those in the Mascot dolomite and Kingsport formation.

Jonesboro limestone.—The Jonesboro limestone is about 2,000 feet thick and represents the limestone phase of the Ordovician part of the Knox group. Less work has been done in subdividing the Knox group in the southeast limestone phase than in the northwest dolomite phase. The Jonesboro limestone is a pure, massive dark-blue-weathering limestone containing thin layers of silty dolomite. Sandstone beds occur in the lower 400 feet. Thin sandstone layers also occur in the lower part of the upper third of this formation. Chert is rare, even in the residuum. The limestone weathers to a deep residual clay which forms red- to orange-colored soil. Where sandstone beds were present, weathered blocks of sandstone are found in the soil.

Ground water occurs in fractures in this formation. Of 13 springs scheduled, all had yields estimated in excess of 10 gpm, but only 4 had yields estimated in excess of 100 gpm. Most of the wells drilled in this formation furnish domestic supplies. Under favorable conditions, industrial or municipal supplies may be obtained.

Two water samples were collected from this formation. The hardness was high in both (183 and 212 ppm), but other chemical characteristics were not objectionable.

Ordovician System

Middle Ordovician Series

Lower and middle parts of Chickamauga limestone

The lower and middle parts of the Chickamauga limestone have been divided into several units in some locations. In others, they have been mapped as one unit.

These rocks consist of blue-weathering limestone, which is generally fine grained, fairly light colored, and slightly silty and which contains scattered, though locally abundant, fossils. About 100 feet below the upper part of the Chickamauga limestone are two persistent beds of altered volcanic ash a foot or more thick. Greenish chert, 1 or 2 inches thick, underlies each of the ash beds. The lower and middle parts of the Chickamauga limestone produce a rather thin rich soil through which appear pinnacles of limestone.

Ground water in these rocks is restricted to fractures that have been enlarged by solution. The presence of silty layers and shaly partings frequently provides impervious layers through which water will not percolate. Where such partings occur within the more massive limestones, bedding-plane solution cavities commonly develop. The fracturing of the limestone by folding and faulting has resulted in a more or less interconnected system of cavities. Many small springs develop at shale-limestone contacts. Where bedding-plane solution cavities or fractures extend to the surface at topographic lows, large springs are found. The success of wells drilled into these rocks depends on the number and size of cavities encountered. Most wells yield at least a domestic supply of water. Several small industries obtain their water supply from these rocks, though it is usually necessary to drill at least two wells to obtain 100 gpm. The lower and middle parts of the Chickamauga limestone are a better aquifer than the upper part.

Water from these rocks usually has a hardness of more than 200 ppm.

Units 1, 2, and 3 of Chickamauga limestone

In places, the lower and middle parts of the Chickamauga limestone have been divided into three units to which formational names have not been assigned. In general, these units can be separated by means of fossil horizons or other geologic guides. The rocks consist of shale and limestone interbedded with silty nodular limestone. The soil produced by weathering is usually a thin yellow moderately rich soil containing many shale chips.

Water in these rocks is restricted to fractures and bedding-plane openings. Small springs are common, and several yielding more than 450 gpm were scheduled. The springs usually issue from or near shale-limestone contacts, indicating that bedding-plane solution cavities are well developed. Wells in these rocks usually have low yields when located on hills or other topographic highs. Wells of larger yield are usually located near permanent streams.

The quality of the water is generally good.

Lenoir limestone and Athens shale

The Lenoir limestone and Athens shale are of the same age. The two units grade into each other south of Knoxville.

The Lenoir limestone, which varies in character, consists of dark-bluish argillaceous nodular limestone about 500 feet thick. Locally, the lowest beds consist of a pure limestone called the Mosheim member, but in other places the lowest beds of the Lenoir are silty. This formation in its pure limestone phase weathers to a moderately rich silty clay soil that is frequently removed by erosion, exposing the underlying rock. The soil from the shaly phase is shallow and poor, with many limestone outcrops.

As in other limestones, ground water occurs in fractures. Of eight springs scheduled from this formation, three were estimated to flow more than 450 gpm. Many domestic water supplies are obtained from wells in this formation.

Analyses of eight water samples indicate that water from this formation has a hardness of less than 200 ppm. Concentration of ions

other than calcium and magnesium is usually low enough not to cause any difficulty in the use of the water.

The Athens shale is about 800 to 1,000 feet thick. It is in part shaly, nodular limestone and in part bluish, yellow-weathering calcareous shale. It weathers to produce a thin acid soil containing many shale chips.

Analysis of depths of wells in Athens shale indicates that the formation behaves hydrologically as a shale rather than a limestone. In East Tennessee, calcareous shales with interbedded limestones are generally good aquifers. The solubility of both the calcareous shale and the limestone tends to make such formations quite permeable. Three springs scheduled in the Athens had yields of more than 450 gpm. Most wells produce at least domestic quantities of water.

Samples of water from 10 sources in this formation were analyzed. The hardness ranged from 46 to 404 ppm and averaged 210 ppm.

Holston formation

The Holston formation ranges in thickness from 200 to 500 feet and contains several different types of rock, including reddish-colored limestone and limy sandstone. The upper members are usually coarsely crystalline and contain quartz sand, whereas the lower portion is thinly bedded and contains more limy shale. In places, members of this formation may contain as much as 50 percent quartz sand. Fossils in the limestone indicate that parts of this formation were formed as reefs. The Holston formation weathers very deeply, producing a dark-red residuum. The members that have a high quartz content form a deep sandy soil with chips and blocks of ferruginous sandstone from which the calcium carbonate has been leached. This formation generally forms knobby red-colored hills.

Water in this formation is restricted to fractures. No large springs were scheduled, but one estimated to yield more than 100 gpm was recorded. The yield of wells drilled in the Holston formation is dependent upon the size and number of fractures intercepted. No large industrial water supply is known to be obtained from this formation, but it furnishes many domestic supplies.

Analyses of water from this formation indicate hardness of less than 150 ppm. The water is generally of good quality.

Ottosee shale

The Ottosee shale consists of about 1,000 feet of blue, yellow-weathering carbonate shale and shaly siltstone with lenses of massive crystalline limestone that becomes thin bedded at the edges. In the northwestern belt of rocks the Ottosee shale consists of a shaly nodular limestone, whereas in the southeastern belts the Ottosee is predominantly shale containing limestone lenses. The soil overlying the Ottosee shale is rather thin and acid, except where limestone weathers to a thicker clay soil. In soil overlying the shaly phases of these rocks, chips of shale can be found. In locations underlain by limestones the soil is somewhat deeper and more fertile.

Ground water occurs in fractures in the limestone. Springs are common in the outcrop areas of these rocks. Of 24 springs scheduled, 5 were estimated to have yields of more than 450 gpm, and 11 were estimated to have yields of less than 10 gpm. The relatively pure limestone lenses in the shaly phase of the Ottosee shale may contain well-developed solution channels. The carbonate shale of the Ottosee shale also has been subjected to solution and is frequently water bearing. Of 129 wells scheduled in the Ottosee shale, 70 wells yielded at least a domestic supply of water within 100 feet. This indicates that, though the weathered Ottosee shale resembles a shale, the unweathered portion of the rock hydrologically resembles a limestone. No industrial or municipal wells are known to have been drilled in the Ottosee shale.

In chemical quality, water from the Ottosee shale resembles that from limestone formations more closely than water from shale formations. Water from the Ottosee can be expected to have a hardness of more than 100 ppm.

Sevier shale

The Sevier shale and its equivalents range in thickness from 2,500 to 4,000 feet and consist largely of blue, yellow-weathering silty to sandy calcareous shale. Locally, beds of blue shaly, nodular limestone; black carbonaceous, slightly calcareous fissile shale; blue or gray, brown-weathering sandstone; and conglomerate are found. These different rock types represent the changes in facies shown on figure 4 opposite page 66 of part II of this report. The Sevier shale usually forms rough, knobby, intricately dissected topography known locally as "slate knobs." Sandstone underlies the knobs, whereas shale free of sandstone frequently forms very flat ground. The soil is thin and full of shale chips.

Ground water in the Sevier shale is restricted to fractures. The formation has been shattered by past earth movements, making the shale rather permeable and therefore one of the better aquifers in East Tennessee. As the shale is calcareous, the fractures have been enlarged by solution to such an extent that numerous wells yield more than 150 gpm. About 50 percent of the wells scheduled in the Sevier shale obtained at least a domestic supply of water within the first 50 feet of drilling. As figures on yields are available for only a part of the wells in the Sevier shale, no conclusion can be drawn as to increase in yield with depth. Examination of cuttings from wells in the Sevier shale indicates that, though fractures are present at depth, they are usually sealed by calcium carbonate deposited from circulating ground waters.

This condition exists also where limestones overlie the Sevier shale. Even where a fault contact is only 50 to 75 feet below the surface, the shale usually is tightly sealed with secondary calcite. If the desired quantity of water has not been obtained within the first 300 feet, it is generally not worthwhile to drill deeper.

Forty springs were scheduled in the Sevier shale. Sixteen had yields estimated to be less than 10 gpm. Two springs had yields estimated to be more than 450 gpm.

Many wells in the Sevier shale located near streams or lakes yield more than 150 gpm. Water levels in wells on valley floors are usually less than 20 feet below the land surface, whereas on the slopes and tops of hills the water level is deeper and usually the yield of wells is less. In general, the best locations for large-yield wells in the Sevier shale are in valleys near permanent streams.

The quality of water from the Sevier shale is generally good. From 24 analyses available, it appears that water from this formation contains less calcium bicarbonate and is lower in hardness than water from limestone. Where the shale contains black carbonaceous material, the water usually has a high sulfate and iron content. The less desirable water is usually obtained from wells of small yield, indicating that in areas of higher yield the undesirable constituents have been removed by circulating ground water.

Moccasin and Bays formations

The Moccasin and Bays formations, though different in lithology, are equivalent in age. The Moccasin formation is found northwest of the center of the Valley and Ridge province; the Bays formation is found southeast of the center. These formations were originally thought to be different in age.

The Moccasin formation is 800 to 1,000 feet thick and is composed of maroon calcareous shale, siltstone, and alternating silty and bluish nonsilty limestone. The formation changes in character from one area to another. The Moccasin formation weathers to a thin limy soil full of reddish shale chips.

In the Moccasin formation, ground water is restricted to fractures. The siltstone and shale often form impermeable members along the top of which bedding-plane solution cavities develop. These horizons give rise to small springs at the foot of hill slopes. Springs yielding up to 100 gpm are occasionally found. This formation is not considered a good aquifer except for domestic supplies. The chemical quality of water is good except for high hardness.

The Bays formation, which ranges from 700 to 1,000 feet in thickness, consists of maroon shale, siltstone, and silty sandstone. The sandstone is predominantly coarse grained but locally grades into fine-grained conglomerate. Locally, white sandstone occurs as layers interbedded with maroon sandstone and siltstone. In some areas, beds of yellow limy shale and siltstone occur near the base. The Bays formation weathers to a shallow maroon soil that is limy and fertile where the rocks are calcareous, and to a thin sandy soil over sandstone.

The Bays formation is not considered a good aquifer. Ground water occurs only in fractures in the rocks. The sandstone is not thick or permeable enough to yield much water. The silty nature of this formation tends to limit enlargement of fractures by solution so that only small quantities of water are available. The quality of the water is generally good. However, the hardness is usually more than 100 ppm.

Upper Ordovician Series

Upper part of the Chickamauga limestone

The upper part of the Chickamauga limestone consists of 700 to 1,000 feet of dark-blue to gray well-bedded or platy to nodular limestone with interbedded shaly partings. A few thin beds of volcanic ash are found near the base of the formation, which is silty or sandy. There are many fossil horizons in this formation.

Ground water occurs in these rocks in fractures. Many small-yield springs are found, but they are of no importance for industrial or municipal water supplies. Some of the purer limestone members give rise to springs yielding more than 100 gpm. Wells drilled into these rocks usually yield domestic supplies, but rarely more than 10 gpm. The water is generally hard.

Unit 4 of Chickamauga limestone

Unit 4 of the Chickamauga limestone consists of 350 to 600 feet of dark-blue to gray bedded or platy to nodular limestone, commonly interbedded with thin shale partings. Volcanic-ash beds are present near the base of this unit, which is usually silty or sandy. Unit 4 weathers to form a rich clay soil, through which the rock crops out locally.

Ground water occurs in this unit in the same way that it does in the upper part of the Chickamauga limestone. Although most springs in this unit are small, there are some large ones. The yield of wells drilled in this unit is dependent upon the number and size of the fractures encountered; the average yield is less than 30 gpm. The chemical quality of water is good except for the hardness which usually exceeds 150 ppm.

Reedsville shale

The Reedsville shale consists of 250 to 400 feet of greenish, yellow-weathering calcareous shale with beds of dark limestone and layers of silty shale and calcareous siltstone. This formation, which has been mapped only where it overlies unit 4 of the Chickamauga limestone, is equivalent in age to the upper part of the Martinsburg shale.

The Reedsville shale yields very little water to wells or springs. The springs that issue from fractures or at lithologic discontinuities usually have flows of less than 10 gpm. A few wells yielding domestic supplies have been drilled. No known industrial supplies have been developed. However, moderate quantities of water probably could be developed near streams.

Martinsburg shale

The Martinsburg shale consists of 200 to 1,000 feet of greenish to bluish, yellow-weathering mostly calcareous shale. Beds of dark medium-grained limestone occur near the base and the middle of the formation. Layers of silty shale and calcareous siltstone also are found at about the middle of the formation. A few beds of volcanic ash are found near the base of the formation. Locally, at the base, there is found a layer or two of calcareous sandstone. This formation weathers to produce a thin and slightly acid clay soil.

Ground-water occurrence is about the same in the Martinsburg shale as in the Reedsville shale. No major water supplies have been developed from the Martinsburg.

Sequatchie and Juniata formations

The Sequatchie and Juniata formations consist of 200 to 400 feet of red and maroon sediments. The two formations intergrade laterally and the boundary between them is arbitrary. The unit is more calcareous in the south than in the north. Where the name Sequatchie is used, the formation consists of pinkish, bluish, and greenish argillaceous limestone. The Juniata formation consists largely of noncalcareous maroon shale, siltstone, and fine-grained silty sandstone. These formations usually form a maroon calcareous, silty shallow soil.

Ground water in these rocks occurs in fractures, most of which have not been enlarged by solution. Small springs at the base of the formation supply domestic needs at some locations. Most drilled wells produce only small quantities of water. The one available analysis of water from this formation indicates that the water is of good quality.

Silurian System

Lower and Middle Silurian Series

Silurian sandstones and shales undivided

In parts of East Tennessee where not enough geologic work has been done to differentiate the formations of Silurian age, they have been mapped as Silurian sandstones and shales undivided. The statements concerning the Clinch sandstone and the Rockwood formation apply to the undivided sandstones and shales. In general, these rocks are not good aquifers.

Clinch sandstone

The Clinch sandstone consists of thick-bedded to massive, well-cemented pure quartz sandstone. The rocks are usually medium to coarse in texture; the sand grains are well sorted and rounded. In the lower portion of the formation the beds are thick, becoming thinner near the top where they are separated by thin layers of sandy shale. The Clinch sandstone forms ridges and crops out in bare ledges and dip slopes. It forms little soil. Large blocks of sandstone usually cover the mountain slopes where the formation crops out.

The Clinch sandstone forms most of the mountains between the Unaka Mountains and the Cumberland escarpment. In general, it is a poor aquifer. The formation is thoroughly cemented with silica, and ground water occurs in fractures in the rock rather than in the openings between sand grains. Where fractures extend to the surface in topographic lows, small springs may be found. Some of these springs are utilized for domestic supplies. No major water supply has been developed from these rocks.

Rockwood formation

The Rockwood formation consists largely of greenish to brownish shale and beds of siltstone and limestone. Hematite beds from 4 feet to less than 1 foot thick are found at different horizons. The shale ranges from a limy type to a sandy and more varicolored type. The formation is from 350 to 800 feet thick. It forms a thin soil full of siltstone or sandstone chips except in the more sandy phases where it forms a sandy, stony soil.

The Rockwood formation is not important as an aquifer because its outcrop is limited. Ground water occurs in fractures, except in more weathered portions which are porous owing to the removal of calcium carbonate. Springs have small yields and occur at changes in lithology. Domestic supplies may be obtained from drilled and dug wells. Water from these rocks is variable in quantity, depending on the part of the formation from which it comes. It is generally hard and may have a high iron content.

Silurian and Devonian Systems

Upper Silurian and Lower Devonian Series

Hancock limestone

The Hancock limestone, generally less than 300 feet thick, consists

of thick beds of limestone and dolomite, many sandy and a few cherty Where this formation approaches its maximum thickness, it weather to form moderately deep sandy clay. Where the formation is thin it has little effect on the topography or soil.

This formation is of little importance as an aquifer, as its limitec outcrop is in mountainous terrane. It is probable that water in it occur in fractures and that domestic water supplies could be obtained fron wells.

Devonian and Mississippian Systems

Upper Devonian and Lower Mississippian Series

Chattanooga shale

The Chattanooga shale consists of black fissile bituminous shalc The formation commonly contains silt in fine laminae or layers. Sand layers are sometimes found near the base of the formation. The thick ness of the Chattanooga shale ranges from about 12 feet at Chattanoog to about 900 feet at the Tennessee-Virginia State line. Where the for mation is extremely thick, it is composed mainly of gray silty shale an silty sandstone. In these places the upper 20 to 50 feet consists of th typical black shale. The thicker deposits of the Chattanooga shal weather to form a thin, acid, silty clay soil in valleys. The thinne deposits have little effect on the soil or topography.

This formation has little importance as an aquifer. No large quar tities of water have been developed from it. Domestic water supplic are obtained from dug and drilled wells, but generally the water i undesirable because of its hardness and high sulfate content.

Mississippian System

Grainger formation and Fort Payne chert

The rocks of these formations are of the same age and represer changes in the type of material deposited. The formation is mapped a the Grainger formation southeast of White Oak Mountain and th Wallen Valley fault, and as the Fort Payne chert northwest of this are Between LaFollette and Cumberland Gap, the Fort Payne chert grad into the Grainger formation.

The Grainger formation consists of 100 to 1,100 feet of bluisl greenish, and brownish clayey shale, sandy shale and siltstone, and thir bedded sandstone. Near the top of the formation the sand content c the beds increases and sandstone becomes more prominent. This fo mation weathers to produce a thin sandy, stony soil of poor qualit

The occurrence of water in the Grainger formation is limited t fractures. In general, this formation is a poor aquifer, but it will usually yield domestic supplies. If water is not encountered in the first 250 feet of drilling, little is to be gained by drilling deeper.

The Fort Payne chert is a siliceous cherty limestone containing 30 percent or more chert. It ranges from 100 to 200 feet thick. The chert can be seen in fresh rock occurring as nodular layers in limestone. The base of the formation consists of greenish noncherty shale that grades upward in a silty cherty limestone. The Fort Payne chert weathers deeply and produces a very cherty soil.

Ground water in the unweathered Fort Payne chert is restricted to fractures. Where the Fort Payne has undergone extreme weathering, the limestone is often completely dissolved, leaving only a porous deposit of chert. Wells drilled into this rock often yield large quantities of water. Springs that yield more than 100 gpm are common. The quality of water from this formation is generally good. However, springs that originate at the contact of the Fort Payne chert and the underlying Chattanooga shale often contain sulfate in excess of 50 ppm. The hardness of water from this formation is usually more than 100 ppm.

Newman limestone

The Newman limestone, which is from 1,200 to 2,500 feet thick, varies in lithology from west to east across East Tennessee. In the western outcrop belts, it is generally a pure, gray, massive limestone containing some chert. Parts of the formation are lighter in color and contain some shaly beds. In the outcrops east of these western beds, the shaly beds appear lower in the section. Farther to the east, the formation becomes more shaly and a few sandstone beds are present. The pure limestones produce a deep, fertile, clay soil containing chert, whereas the shaly limestones produce a shallower, silty soil.

Ground water in this formation is restricted to fractures developed in the limestone and calcareous shale. The contact between the shale and pure limestone is frequently water bearing and gives rise to numerous springs. The yield of wells is dependent upon the number and size of the solution cavities encountered. These cavities decrease in size and number with depth, so that the first 300 feet is most likely to yield water.

Five analyses of water from the Newman limestone show that the hardness of the water ranges from 21 to 181 ppm. Chemical characteristics of this water make it suitable for some industrial and most municipal uses.

Pennington formation

The Pennington formation, which is 150 to 2,250 feet thick, consists of red, purple, and green shale; red, green, and brown sandstone; and yellow silty limestone. The thickness of these beds varies and limestone

is always present in minor amounts. Shale interbedded with thin sandstone layers predominates in the formation from the Georgia-Tennessee State line northeast of Rockwood, Tenn. Northeast of Rockwood, sandstone becomes more prominent toward the Virginia-Tennessee State line. In its northeast extremities, shale comprises more than half the formation. This shale readily forms clay and produces a moderately deep soil. The sandstone beds northeast of Rockwood tend to form a thin sandy, stony soil.

In this formation, water is restricted to fractures and bedding planes. Although sandstones are well cemented and slightly permeable, water is frequently found at shale-sandstone contacts. No large springs issue from this formation and most springs yield less than 10 gpm. The yield of wells is limited to domestic supplies, usually obtained in the first 200 feet of drilling.

Most of the water from this formation is suitable for domestic supplies without treatment, but the iron content may exceed 0.5 ppm.

Pennsylvanian System

Pennsylvanian rocks undivided

The Pennsylvanian rocks crop out along the western edge of the Cumberland Plateau, which rises about 1,000 feet above the Valley and Ridge province and form an escarpment along its western edge. The topography developed on these essentially flat lying rocks is very rugged, consisting of steep-sided valleys separated by narrow ridges. The area does not lend itself to agricultural development and does not have a large population. With the exception of a few small cities and towns where the chief industries are coal mining and lumbering, there has been little demand for ground water other than for domestic supplies.

The Pennsylvanian rocks consist of alternating beds of shale, sandstone, and conglomerate, and numerous workable beds of coal. The shales are usually gray or brown and are siliceous. The sandstones range from thin beds, in the predominantly shale sections, to large massive members hundreds of feet thick. These sandstones are usually well cemented and not very permeable. The conglomerates also form large massive beds more than 100 feet thick. The coal beds are generally less than 3 feet thick but in some places are thicker.

Ground water in these rocks is confined to fractures developed in the sandstone and shale. The rocks have little primary porosity. The rugged topography caused by erosion of the essentially flat lying formations does not allow for recharging the few buried permeable formations, except by downward percolation of water through fractures in the nonpermeable material. Streams have sustained flows through the wet months, but during the dry months of September, October, and November they have very low flows, which indicate little natural discharge of ground water.

The best wells in these formations are near major streams. The alluvial material in the valleys, which is primarily quartz pebbles, boulders, and sand, is a permeable medium that permits the downward flow of water to fractures in the bedrock. Where faulting or folding is present, fractures in the rocks are more numerous, and such locations are favorable sites for wells. Wells yielding more than 300 gpm have been drilled in highly fractured sandstone, whereas the usual yield of wells in these formations is less than 40 gpm. As most of the sandstones are tightly cemented, there is little advantage in drilling to depths greater than 300 feet.

The quality of water in these formations is quite variable. Some wells in a given area yield water of good quality, whereas other wells in the same area yield water that is unfit for municipal use without suitable treatment. Water derived from these rocks is usually high in sulfate and iron, the iron content frequently exceeding 1 ppm. The presence of coal and carbonaceous material is also a cause of poor chemical quality.

Late(?) Paleozoic Intrusive Rocks

Igneous rocks of late Paleozoic age, consisting of mica-peridotite and metadiorite, crop out in Sevier and Union Counties. The outcrops have a very limited areal extent, and the rocks therefore do not have any importance as aquifers. The age of these rocks is uncertain.

Tertiary (?) System

Residual deposits

Overlying the rocks of East Tennessee is a nearly continuous mantle of unconsolidated material, varying in chemical and physical character and reflecting the underlying geology. This mantle or residuum, which ranges in thickness from less than a foot to more than 100 feet, serves as an aquifer supplying many domestic wells and as the recharge area for the underlying consolidated rocks. The residuum, produced by weathering of different rock types, is diagnostic of the original rock and frequently has been used to identify the formation from which it was derived.

Residuum overlying relatively pure limestone and dolomite may accumulate to thicknesses of more than a hundred feet. In some cases the weathering is very irregular and the residuum may be a few feet thick in one location, whereas a short distance away horizontally it may be more than a hundred feet thick. Where such conditions are exposed

by hydraulic mining, as in the barite and manganese districts, the bedrock is shown to be composed of numerous pinnacles irregularly spaced and of varying size and shape. Each pinnacle is completely surrounded by the residuum except at its base, where it is still attached to the bedrock.

The residuum derived from siliceous limestone and dolomite contains a high percentage of chert. This chert and the numerous buried pinnacles of unweathered bedrock frequently deflect drilling tools, making difficult the drilling of a straight well. Frequently chert in the residuum occurs in stratified layers or zones which form permeable zones in the clay. Bodies of perched water in these chert zones within the residuum frequently supply water to dug wells. How these zones of chert are formed is not fully understood, as there is evidence that the residuum has not been transported horizontally, except possibly by soil creep on the steeper slopes. The presence of chert in the residuum and the pinnacles of bedrock extending upward undoubtedly aid in recharging the underlying aquifers. Many dug wells in the residuum obtain their water at the residuum-bedrock contact.

The soil overlying the calcareous shale formations of East Tennessee is generally relatively thin. This material has been leached of most of the calcium carbonate it contains but usually retains features of the parent rock, such as bedding. The soil grades downward from the surface into the bedrock, with no sharp break. The surface is generally covered with shale chips. Interbedded limestone in these shale formations is frequently weathered so deeply that it appears only as clay seams in the typical shale soil.

The residuum overlying the shales of East Tennessee has little importance as an aquifer. It is thin and seldom extends downward to the water table. Dug wells usually penetrate the unweathered shale before obtaining water. Water-level fluctuations in dug wells indicate that the weathered shale readily allows the downward percolation of water. Where the permeability of the underlying shale bedrock is low, the residuum may be waterlogged.

The crystalline rocks of East Tennessee, such as granite, gneiss, and schist, weather deeply though somewhat irregularly. The residuum retains the original structures of the parent rock but lacks cohesion and is very soft. In this material, dug wells usually intercept quantities of water sufficient for domestic supplies in the lower portion of the residuum at or near the unweathered rock.

Siltstone and impure sandstone weather into a residuum somewhat similar to that derived from shale. The material grades, with no abrupt change, from the surface downward to the unweathered rock. Such material contains more quartz than the shale residuum. Calcareous sandstones weather to form a clay containing sand grains or a porous friable material known as "rottenstone." Pure quartz sandstone and conglomerate resist chemical weathering, but the products of physical weathering form talus slopes of blocks varying in size. Most of this material, with the possible exception of talus, has no importance as an aquifer. Talus along the base of mountain slopes frequently supplies small quantities of water to springs.

Quaternary System

Pleistocene (?) Series

High terrace deposits

Deposits of material very similar to that described later under Alluvial deposits are found along the larger streams of East Tennessee, but at elevations much higher than the present flood plains. These deposits, which range up to 50 feet in thickness, occur at elevations up to several hundred feet above the nearby rivers and are evidently remnants of former flood-plain deposits. The material is usually very heterogeneous and poorly bedded.

The occurrence of water in these deposits is restricted to small bodies of perched water in the more permeable zones. In wet weather, seepage springs frequently develop at the contact of the terrace material and the underlying material. Owing to their restricted areal extent and high silt content, these deposits do not make good aquifers.

Recent Series

Alluvial deposits

The alluvial material found along the smaller streams of East Tennessee is predominantly local in origin. As the streams become larger, the alluvium contains more and more material derived from localities farther away. The flood plains of the major streams are underlain by alluvium in thicknesses ranging from a thin veneer to about 40 feet.

This material has a wide range in particle size. Much of it is silty sand and silty loam, reflecting very closely the character of the underlying rocks, yet it may contain conspicuous foreign pebbles from areas farther away. This heterogeneous material generally does not make a good aquifer, as its permeability is low. Where the deposits are better sorted, the permeability is higher.

Ground water generally occurs under water-table conditions in these deposits. Exceptions would be where the permeability is low near the top of the deposit and high near the bottom of the deposit, thereby establishing an artesian system. Where water-table conditions exist, water is frequently found a short distance below the surface, but where

artesian conditions exist, it may be necessary to dig a well to the contact between the alluvium and bedrock before the well produces enough water for a domestic supply. No known industrial or municipal supplies have been developed by wells in these deposits in East Tennessee. Test drilling in such deposits near some of the larger streams might yield information indicating the possibility of developing moderately large ground-water supplies. In such locations, wells designed for these types of aquifers or infiltration galleries should be used to develop the maximum amount of water.

The occurrence of large springs in these deposits is not unusual. Several municipalities in East Tennessee have developed water supplies from such sources.

Hamilton County

(Area 576 square miles, population 208,255)

General Features

Hamilton County is in the southwest corner of the area considered in this report. It is roughly rectangular, its maximum length being about 30 miles and its average width about 18 miles. It is bounded on the north by Rhea and Meigs Counties, on the east by Bradley County, on the south by Georgia, and on the west by Marion, Sequatchie, and Bledsoe Counties.

Chattanooga, the county seat and principal city, is in the southwestern part of the county on the Tennessee River, 100 miles southwest of Knoxville. It has a population of 131,041. Smaller towns are Sale Creek, Soddy, Birchwood, Hixson, Ooltewah, and Apison.

All rural communities are connected with Chattanooga by well-maintained paved or graveled roads. These include four paved U. S. highways. The county is served by four railroads—the Southern Railway System; the Nashville, Chattanooga & St. Louis Railway; the Central of Georgia Railway; and the Tennessee, Alabama & Georgia Railway. Daily passenger and mail service is available at Lovell Field, the municipal airport, 9 miles east of Chattanooga.

A large part of the population is supported by industrial employment, and most of the factories are in Chattanooga. Manufactured articles include foundry and machine-shop products, confectionery, furniture, mattresses and beds, hosiery and other knit goods, bakery products, patent medicines, lumber and other wood products, stoves and furnaces, enamelware, agricultural implements, boilers, and tile.

Mineral resources of the county include coal, iron ore, clay, limestone, sandstone, sand, gravel, bauxite, and manganese.

About 65 percent of the county is forested, and the part used for agriculture is planted chiefly in corn, hay, and wheat. Peaches and strawberries are shipped to northern markets; apples, cotton, and vegetables are other important cash crops.

Geology

The county is a part of two physiographic provinces—the Valley and Ridge and the Cumberland Plateau; about three-fourths of it is in the Valley and Ridge province and about one-fourth on the Cumberland Plateau. The topography of the Valley and Ridge province consists of alternating, parallel ridges and valleys that trend northeast. Much of the Cumberland Plateau, which borders the southwestern part of the Valley and Ridge province, is deeply dissected. Its general

elevation there is about 2,000 feet, which is about 1,000 feet above the adjoining ridges and valleys.

The entire county is underlain by sedimentary rocks consisting of limestone, dolomite, shale, and sandstone of Paleozoic age. Most of the part in the Valley and Ridge province is underlain by limestone and dolomite of the Knox group, although small areas are underlain by argillaceous limestone, noncalcareous shale, sandstone, interbedded sandstone and shale, and interbedded limestone and shale. In most places the rocks dip to the southeast.

Five well-defined minor physiographic belts cross the county in a northeast direction, parallel to the strike of the formations. Most of these belts are the result of severe folding and faulting of the formations and of subsequent differential weathering of the rocks.

The westernmost belt includes Walden Ridge, Lookout Mountain, and Raccoon Mountain, all of which are part of the flat-topped Cumberland Plateau. The top of Walden Ridge is comparably flat, but the eastern edge is an escarpment dissected by narrow V-shaped valleys. Lookout Mountain and Raccoon Mountain are narrow and have broken, irregular tops. The rocks which underlie these mountains are sandstone, shale, conglomerate and coal of Pennsylvanian age and the Pennington formation and Newman limestone of Mississippian age.

The second belt is the valley of the Tennessee River, which lies between Walden Ridge on the northwest and Whiteoak Mountain on the southeast. This area is underlain largely by formations of the Knox group of Cambrian and Ordovician age and the Chickamauga limestone of Middle Ordovician age.

The third belt, which lies east of and parallel to the valley of the Tennessee, consists of Whiteoak Mountain, a narrow but continuous ridge that rises about 600 feet above the adjacent valleys. Whiteoak Mountain is underlain chiefly by the Sequatchie formation of Ordovician age and the Rockwood formation of Silurian age.

The fourth belt is made up of a series of ridges and valleys southeast of and parallel to Whiteoak Mountain. The underlying rocks are chiefly the soft shale, sandy shale and limestone of the Conasauga group of Cambrian age.

Grindstone Mountain, the fifth physiographic unit, consists of less than 2 square miles and is between Whiteoak Mountain and the Hamilton-Bradley County line. The mountain is capped with flat-lying sandstone of Pennsylvanian age.

Ground Water

In the consolidated sedimentary rocks that underlie Hamilton County, ground water occurs only in fractures formed when the rocks were folded and faulted. The original porosity of the sandstone and other clastic rocks has been destroyed by the deposition of silica and calcium carbonate. In the sandstone and shale that underlie the Cumberland Plateau the fractures are generally small and discontinuous; hence, the yield of wells drilled in these rocks is generally quite small, seldom exceeding a few gallons per minute.

Fractures in the limestone and dolomite which underlie large areas of the Valley and Ridge portion of the county have generally been enlarged by the solvent effect of percolating ground water. The yield of wells drilled in such rocks may be quite high. However, as the distribution of fractures in limestone and dolomite is quite erratic, it is impossible to determine, before drilling, what the yield of a well will be.

Analysis of records of wells drilled in the Chattanooga area and elsewhere in East Tennessee indicates that wells that yield 100 gpm or more are generally located near permanent surface streams. Although wells away from streams occasionally yield large quantities of water, such instances are by no means common.

The yields of wells drilled in shales, such as those of the Conasauga group, are generally low. However, where water-bearing cavities developed in limestone lenses in the shale are encountered, wells may yield up to 100 gpm.

The municipal water supply of Chattanooga is derived from the Tennessee River. Several utility districts on the outskirts of Chattanooga have developed springs. There are numerous springs, some of large size, in the parts of the county underlain by formations of the Knox group.

TABLE 35.—DISCHARGE MEASUREMENTS OF SELECTED SPRINGS IN HAMILTON COUNTY

Spring	Location	Date of measurement	Discharge (gpm)	Temperature (°F.)		Remarks
				Air	Water	
Anderson (no. 180–S)	5 miles southwest of Georgetown	4/15/31	4,640	74	58	Clear
		6/13/31	767	..	..	Do.
		11/ 2/31	458	62	58	Do.
		6/20/50	2,108	90	60	Do.
		7/18/50	1,608	85	59	Do.
		8/ 2/50	4,738	85	59	......
		9/13/50	7,009	85	59	Clear
		10/17/50	1,894	71	59	......
		11/15/50	1,883	48	58	......
		12/20/50	3,736	33	57	......
		1/19/51	4,792	55	58	......
		2/15/51	4,974	49	58	......
		3/13/51	6,183	38	58	......
		4/17/51	5,756	46	59	......
		5/16/51	2,345	75	59	......
		6/20/51	1,936	73	60	......

TABLE 35.—DISCHARGE MEASUREMENTS OF SELECTED SPRINGS IN HAMILTON COUNTY—Continued

Spring	Location	Date of measurement	Discharge (gpm)	Temperature (°F.)		Remarks
				Air	Water	
Blue	7 miles north of Harrison	4/15/31	3,200	72	58	Clear
		7/15/31	1,810	79	59	Do.
		11/ 2/31	1,650	55	58	Do.
Cave (no. 129–S)	4 miles southwest of Daisy	3/27/31	7,010	50	51	Clear
		7/18/31	328	74	56	Do.
		10/30/31	36	54	54	Do.
McCallie	3 miles west of Birchwood	4/15/31	1,170	70	58	Clear
		7/15/31	601	79	57	Do.
		11/ 2/31	408	57	59	Do.

The chemical quality of ground water in Hamilton County is generally quite good. The water usually requires no treatment, as far as chemical quality is concerned, for most uses. Analyses of representative samples of ground water from Hamilton County are given in table 37.

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY

Shown on Plates 12 and 13

Method of lift: A, air lift; B, bucket; C, centrifugal; J, jet pump; L, lift pump; P, pitcher pump; T, turbine pump.
Use of water: Ab, abandoned; D, domestic; In, industrial; Ir, irrigation; P, public supply; S, stock

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth to water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
	CHATTANOOGA																
1	2112 Dayton Blvd.	Sanders' Dairy	H. L. Carlson	Valley	690	130	130	6	Limestone	Mfp	......	......	C	25	62	In	
2	4800 Central Ave.	Tenn. Products Corp.	E. O. Hembree	do.	680	200	200	6	do.	Ouc	14	......	C	60	....	In	
3	4608 Kirkland Ave.	Lookout Oil & Refining Co.	O'Rear	do.	580	105	105	6	do.	Ouc	......	......	L	75	69	In	
4	4500 Highland Ave.	Chatt. Glass Co.	....	Slope	710	285	285	6	do.	Os	30	......	C	150	70	In	
5	1233 Market Street	Fisherman's Headquarters	Wm. Kittle	Valley	670	65	65	8	Dolomite	O€k	2	......	C	28	68	In	Water sample analyzed.
6	241 Wiehl St.	Erlanger Hospital	do.	Slope	710	300	......	8	do.	O€k	......	......	C	150	64	In	
7-1	Rossville Blv.	O. B. Andrews Co.	Grey Artesian Well Co.	Valley	660	383	......	8	do.	O€k	......	......	C	294	61	In	
7-2	do.	do.	do.	do.	660	350	......	8	do.	O€k	+	......	C	150	61	In	
8-1	27th & Broad St.	Combustion Engineering Co.	....	do.	660	100	......	6	Shale	Sr	25	......	A	......	65	In	
8-2	1032 W. Main	do.	....	do.	660	393	398	8	do.	Sr	27	......	C	160	64	In	Water used for air conditioning.
8-3	do.	do.	....	do.	660	200	200	6	do.	Sr	27	......	C	160	64	In	
9	Middle St.	J. H. Allison & Co.	....	do.	660	105	......	6	do.	Sr	36	......	C	500	62	In	Well dug to 47.5 feet, drilled to 105.5 feet. Water sample analyzed.
10	2800 Broad S.	The Wheland Co.	Finton	do.	660	216	......	6	do.	Sr	......	......	......	50	....	Ab	
11	3100 St. Elmo Ave.	Robert Scholz Tannery	W. W. Renshaw	do.	660	100	......	8	do.	Sr	......	......	C	350	62	In	
12-1	Manufacturers' Rd.	Samuel Stamping & Enameling Co.	do.	do.	660	250	50	8	Limestone	Os	30	......	C	10	62	In	
12-2	do.	do.	do.	do.	660	250	30	8	Shale	Sr	30	......	C	25	62	In	Well tested with air lift for 8 hours at 40 gpm.
12-3	do.	do.	do.	do.	660	300	......	8	do.	Sr	......	......	......	0	....	Ab	Dry hole.
13	do.	Somerville Iron Works	....	do.	670	190	......	6	do.	MDc	......	......	C	60	62	In	
14-1	1601 Rossville Blvd.	Chattanooga Sausage Co.	H. L. Carlson	do.	660	256	......	8	Dolomite	O€k	3	......	C	185	58	In	
14-2	White and William St.	do.	do.	Slope	670	350	......	8	do.	O€k	75	......	C	135	62	In	
15-1	Moccasin Bend Rd.	American Cyanamid Co.	Sullivan	do.	660	210	......	12	Shale	Sr	7-8	......	A	62	60	In	Reported drawdown of 4 feet after 1 hour pumping at 62 gpm.
15-2	do.	do.	....	do.	660	250	......	10	Shale	MDc	7-8	......	C	250	60	In	Reported drawdown of 4 feet after 1 hour pumping at 62 gpm. Water sample analyzed.
16-1	1111 Chestnut St.	Brock Candy Co.	W. W. Renshaw	do.	670	300	......	5	Limestone	Olmc	40	......	A	55	63	In	Reported drawdown of 160 feet after 30 minutes pumping at 55 gpm.
16-2	do.	do.	do.	do.	670	310	......	8	do.	Olmc	40	......	C	55	63	In	Reported drawdown of 160 feet after 10 minutes pumping at 55 gpm.
17-1	Manufacturers' Rd.	Tenn. Paper Mills	....	do.	660	170	......	16	Shale	Sr	......	......	C	600	60	In	Yields about 600 gpm for 8 hours. After this time quantity declines appreciably. Recovers in about 24 hours.
17-2	do.	do.	....	do.	660	257	......	10	do.	Sr	37	7/48	......	......	....	Ab	Well too crooked to permit setting pump.
18	1601 Carter St.	Ross-Meehan Foundries	Wm. Kittle	do.	670	190	110	6	do.	Sr	30	......	C	100	60	In	Water used for air conditioning.
19	E. 14th St.	Tenn. Stove Co.	E. O. Hembree	do.	670	300	30	8	Limestone	Olmc	......	......	C	50	60	Ab	Well abandoned as water was muddy.

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth to water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
20-1	1715 W. 38th St.	Chattanooga Medicine Co.	H. L. Carlson	Slope	720	410	......	8	Limestone	Mn	60	......	C	225	62	In	Water sample analyzed.
20-2	do.	do.	....	do.	730	260	......	6	do.	Mn	60	......	C	100	58	In	
21	Hooker Rd.	Wilson & Co.	H. L. Carlson	do.	670	400	......	10	do.	Olme	......	......	C	......	....	Ab	Well pumps dry in 13 minutes when pumped at 63 gpm.
22	3744 Brainerd Rd.	Kay's Ice Cream Co.	do.	do.	720	120	......	8	Dolomite	Olv	......	......	C	43	58	In	
23-1	460 Dodson	Chatt. Area Milk	do.	Valley	675	410	......	8	do.	Olme	4	......	C	40	56	In	Water sample analyzed.
23-2	do.	do.	do.	do.	675	250	......	8	do.	Olme	4	......	....	......	....	Ab	
24	1506 McCallie Ave.	Liggetts' Ice Cream Co.	E. O. Hembree	Slope	690	402	......	8	do.	Olme	30	......	C	20	57	In	Well yielded 50 gpm prior to 1947.
25	2232 E. 23rd St.	Associated Dairies	....	Valley	665	80	40	6	do.	Olme	75	......	C	15	56	In	
26	234 E. 11th	Tops Chewing Gum, Inc.	....	Slope	690	200	......	8	do.	O-Ck	......	......	C	25	....	In	
27	2341 Rossville Blvd.	United-Morning Star Dairies	E. O. Hembree	do.	640	275	40	6	do.	Olme	33	......	C	60	58	In	
28	2416 E. Main St.	Chattanooga Ice Delivery Co.	J. O. Keele	Valley	670	613	......	8	do.	Olme	60	......	....	60	58	Ab	No appreciable quantity of water encountered below 50 feet.
29	1021 Cross St.	W. S. Dickey Clay Mfg. Co.	....	Slope	655	300	......	6	Shale	Sr	20	......	A	80	58	In	
30	100 W. 1st St.	Sherman & Riley, Inc.	....	do.	650	205	30	6	Dolomite	Olme	35	......	J	20	58	In	
31	709 Broad St.	Tivoli Theatre	E. O. Hembree	do.	680	390	......	8	do.	Olme	40	......	C	75	60	In	Water used for air conditioning.
32	Riverside Dr.	Cumberland Case Co.	W. W. Renshaw	do.	680	230	......	8	do.	O-Ck	30	......	C	50	58	In	
33	do.	Mohawk Rubber Co.	E. O. Hembree	do.	646	302	45	8	do.	O-Ck	20	4/45	....	180	60	Ab	Test well.
34	St. Elmo Ave.	King Provision Co.	....	Valley	660	150	......	6	Shale	Sr	......	......	....	50	....	Ab	Well abandoned as water was muddy.
	LOOKOUT MTN.																
35	2 mi. W.	Farmfield Dairy	Hale	Slope	660	65	20	6	Limestone	Os	......	......	J	8	58	S	
	LUPTON CITY																
36-1	In town	Dixie Mercerizing Co.	Wm. Kittle	Valley	680	101	90	8	Dolomite	O-Ck	35	......	C	150	58	In	
36-2	do.	do.	W.W.Renshaw	do.	680	90	90	8	do.	O-Ck	35	......	C	100	58	In	
36-3	do.	do.	Wm. Kittle	do.	680	133	......	8	do.	O-Ck	35	......	C	150	58	In	
	TYNER																
37	2½ mi. W.	Ray Moss Farms	do.	do.	715	167	50	8	do.	On	60	......	J	10	62	S	
	LUPTON CITY																
38	3 mi. SE.	Sterchi & Sons Dairy	do.	Slope	680	105	100	6	do.	Oc	40	......	C	35	62	In	Well originally yielded 65 gpm.
	HARRISON																
39	2½ mi. NE.	I. W. Champion	E. O. Hembree	do.	820	55	55	6	do.	O-Ck	5	......	J	5	65	D,S	
	TYNER																
40	3 mi. W.	Fred Sterchi, Sr.	W.W.Renshaw	do.	800	285	......	8	do.	Oc	......	......	L	......	65	D,S	
41	2 mi. W.	Honny Oaks School	....	do.	720	200	100	6	do.	On	40	......	C	50	60	P	Water sample analyzed.
43	2 mi. NW.	W. S. Keese	....	Valley	710	67	67	6	do.	On	60	......	J	5	58	D,S	
43	1 mi. SW.	J. H. Reed	T. V. Wooten	Slope	710	110	......	6	do.	O-Ck	100	......	J	6	58	D	

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth of water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
44	OOLTEWAH 1 mi. NE.	W. L. Hall	....	Valley	800	800	.....	6	Limestone	Och4	20	.....	J	5	58	D	Well drilled for Atlas Powder Co. Tested with air lift for 24 hours at 180 gpm.
45	1 mi. N.	W. G. Fitzgerald	Ed Wooten	Hilltop	800	76	.....	6	do.	Olmc	21	.....	B	.....	.....	D	
46	TYNER 1½ mi. SE.	Hamilton County Hospital	....	do.	770	360	.....	8	Shale	Ꞓc	.....	.....	C	50	60	P	Water from well contains small amount of fine quartz sand. Water sample analyzed.
47	OOLTEWAH 2 mi. N.	Wyla Wilson	Wm. Kittle	Valley	765	76	.....	6	Limestone	Olmc	18	.....	B	.....	.....	D	Supplies three families.
48	COLLEGEDALE In town	Sou. Jr. College	do.	Slope	850	150	.....	8	do.	Mfp	0	7/48	C	100	58	Ab	Well will pump 100 gpm for 18 hours, then requires 3 days for recovery. Water sample analyzed.
49	LUPTON CITY 1½ mi. SW.	Meadowlake Country Club	....	do.	700	96	.....	6	Dolomite	O-Ꞓk	.....	.....	C	70	60	P	Water sample analyzed.
50-1	DAISY In town	Kingsborro Silk Mills	....	Valley	700	186	.....	6	Limestone	Mn	2	.....	C	110	58	In	
50-2	do.	do.	....	do.	700	92	.....	6	do.	Mn	25	.....	C	110	60	In	
50-3	do.	do.	E. O. Hembree	do.	700	72	.....	6	do.	Mn	30	.....	C	55	60	In	
51-1	do.	B. Mifflin Hood Co.	....	do.	700	1,390	.....	6	do.	Mn	150	.....	A	25	58	In	Oil test.
51-2	do.	do.	....	do.	700	65	65	6	do.	Mn	15	.....	C	25	58	In	Yield fluctuates seasonally.
51-3	do.	do.	....	do.	700	100	.....	8	do.	Mn	30	.....	C	25	....	In	do.
52	SHEPHERD 1¼ mi. SE.	T. Jones	....	Slope	685	33	33	24	Shale	Ꞓc	31	7/48	B	.....	....	Ab	Well goes dry in summer.
53	2 mi. SE.	Mrs. H. H. Walters	....	Valley	700	52	52	6	do.	Ꞓc	10	.....	L	.....	58	D	
54	do.	Martin Cordley	....	do.	700	16	16	24	do.	Ꞓc	12	7/48	L	.....	58	In	Well supplies water for fish rearing ponds.
55	2½ mi. SE.	Dennis Martin	....	Ridge	830	400	.....	6	Dolomite	O-Ꞓk	.....	.....	....	0	....	Ab	Dry hole.
56	1 mi. E.	Bruce Vanderback	....	Slope	720	53	53	36	Shale	Ꞓc	48	7/48	L	.....	60	Ab	
57	TYNER 1½ mi. SW.	S. R. Underwood	....	Valley	715	79	.....	6	do.	Ꞓc	40	.....	....	.....	....	Ab	
58	do.	W. J. Bell	....	Hilltop	700	68	.....	6	do.	Ꞓc	26	7/48	....	.....	....	Ab	
59	2 mi. SE.	Howard May	....	Valley	750	85	.....	6	do.	Ꞓc	.....	.....	L	10	60	S	
60-S	2½ mi. SE.	John R. Graham	....	do.	763	.....	.....	....	do.	Ꞓc	.....	.....	....	10	61	D,S	
61	do.	E. L. Parton	Ed Wooten	do.	770	38	.....	6	do.	Ꞓc	9	7/48	....	.....	....	Ab	
62	SHEPHERD 3 mi. SE.	Frank Gray	....	Ridge	715	45	.....	6	do.	Ꞓc	27	7/48	B	.....	61	D	
63	4½ mi. SE.	A. J. Ervine	....	Slope	745	23	22	36	do.	Ꞓc	17	7/48	....	.....	....	Ab	
64	4 mi. SE.	G. O. White	....	do.	750	42	.....	6	do.	Ꞓc	18	7/48	B	.....	62	D	
65	TYNER 1 mi. E.	J. Standifer	....	Valley	760	16	16	21	do.	Ꞓc	15	7/48	L	.....	62	Ab	
66	2 mi. E.	Mrs. J. M. Moore	....	Hilltop	790	125	.....	6	do.	Ꞓc	09	7/48	B	.....	....	D,S	
67	3 mi. NW.	TVA	....	Slope	700	57	.....	36	Dolomite	Oc	31	7/48	....	.....	....	Ab	
68	LUPTON CITY 3 mi. E.	do.	....	Hilltop	740	45	.....	4	do.	Ꞓcr	40	7/48	....	.....	....	Ab	
69	do.	do.	....	do.	740	62	.....	4	do.	Ꞓcr	45	7/48	....	.....	....	Ab	

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth of water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
70	3 mi. E.	TVA	....	Hilltop	745	50	......	4	Dolomite	€cr	48	7/48	...	......	....	Ab	
71	do.	do.	....	do.	740	204	......	4	do.	€cr	41	7/48	...	......	....	Ab	
	HARRISON																
72	1 mi. NW.	J. Wolensky	....	Slope	740	115	......	6	do.	Oc	40	......	L	10	62	D	
	TYNER																
73	3½ mi. SE.	C. S. Holder	....	do.	760	22	10	24	do.	O€k	3	7/48	B	......	62	D	
	OOLTEWAH																
74	2 mi. NW.	G. R. Wilson	....	do.	740	41	40	36	do.	O€k	33	7/48	B	......	63	D	Goes dry in summer.
75	do.	John Clark	....	do.	740	160	......	6	do.	O€k	20	......	L	10	....	D	
	TYNER																
76	½ mi. SW.	S. F. Johnson	....	do.	725	46	45	36	Shale	€c	33	7/48	B	......	....	D	
	OOLTEWAH																
77	2 mi. W.	J. McGill	....	do.	910	24	24	48	Dolomite	Ocn	20	8/48	B	......	62	D	
78	1 mi. SW.	T. M. Wrinkle	....	do.	830	43	......	36	do.	Ocn	21	8/48	...	......	....	Ab	
	COLLEGE-DALE																
79	1½ mi. SW.	Tom Mostert	Ed Wooten	Valley	810	83	20	6	Limestone	Och4	27	8/48	B	......	62	D	
80	2 mi. SW.	C. S. Howard	....	do.	840	56	......	6	do.	Olmc	25	8/48	B	......	63	D	
81	3½ mi. SW.	T. L. Boyd	....	do.	790	37	......	36	do.	Olmc	28	8/48	B	......	62	D	
82	1 mi. W.	Fred Robinson	....	do.	880	60	......	6	do.	Olmc	30	......	L	10	....	D,S	
83	1½ mi. S.	W. L. White	....	Hilltop	960	81	......	48	do.	Mn	60	......	L	10	63	D,S	
84	2½ mi. S.	E. R. Stafford	....	do.	940	49	......	36	do.	Mfp	45	......	L	......	62	D	
85	1 mi. E.	Ed Chestnut	....	Valley	820	33	......	36	do.	Mfp	19	8/48	B	......	63	D	
	APISON																
86	½ mi. N.	T. L. Poe	....	do.	870	33	......	....	Shale	€ra	25	......	L	......	63	D	
	OOLTEWAH																
87	2 mi. W.	E. L. Fox	Pat Carlson	Hilltop	1,000	250	......	6	Dolomite	Ocn	45	......	L	......	63	P	Supplies four houses.
88	1 mi. NW.	B. H. Simms	....	Slope	830	48	......	48	do.	Ocn	37	8/48	B	......	63	D	
89	1½ mi. NW.	John Harris	....	do.	850	35	......	36	do.	Ocn	4	8/48	B	......	62	D,S	
90	3 mi. N.	Fairview Baptist Church	....	do.	810	60	......	6	do.	O€k	30	......	L	......	63	P	
91	2½ mi. N.	J Plots	H. L. Carlson	Hilltop	800	68	......	8	do.	O€k	38	......	L	......	61	D,S	
92-S	do.	F. Raper	....	Valley	700	......	......	...	do.	O€k	......	......	...	150	61	S	
93	do.	E. E. Ramsey	....	do.	775	70	......	8	Limestone	Olmc	6	8/48	B	......	62	D	Well reported to flow in wet weather.
94	3 mi. N.	Harmon Moon	Ed Wooten	do.	770	47	......	6	do.	Olmc	20	......	C	10	61	D	
95	In town	Mrs. Lance Poe	do.	do.	770	72	......	6	do.	Olmc	10	......	J	10	....	Ab	Well formerly supplied five houses and two filling stations.
	APISON																
96	4 mi. SW.	Hooke Parten	....	Slope	800	310	......	8	do.	Or	......	......	...	......	....	Ab	Dry hole.
97	do.	H. B. Parten	....	do.	810	200	......	6	do.	Or	......	......	...	......	....	Ab	Do.
98-S	do.	Hoke Parten	....	do.	800	......	......	....	Shale	Or	......	......	...	25	61	D,S	
99-S	do.	James Stone	....	Valley	780	......	......	....	Limestone	Olmc	......	......	...	500	61	S	
	COLLEGE-DALE																
100-1	4 mi. SW.	L. A. Banks	....	Hilltop	1,000	410	......	6	Dolomite	Ocn	......	......	...	......	....	Ab	Do.
100-2	do.	do.	....	Slope	900	200	......	6	do.	Ocn	......	......	L	......	....	D,S	
101	5 mi. SW.	V. Caylor	....	Valley	710	25	......	36	do.	€cr	12	8/48	B	......	63	D	
102	3½ mi. SW.	Howard Miller	....	do.	840	50	50	24	do.	Ocn	31	8/48	B	......	63	D	
103	do.	Mrs. R. C. Hall	Wm. Kittle	Slope	880	100	......	8	do.	Ocn	95	8/48	...	......	....	Ab	Do.
104	½ mi. NW.	James Hickman	do.	do.	820	62	......	8	Shale	Sr	1	8/48	...	......	62	Ab	
105	1 mi. N.	J. W. Watkins	....	do.	860	20	......	36	Limestone	Mn	8	8/48	B	......	63	D	
106	do.	Earl Taylor	O'Neal	do.	900	66	30	8	do.	Mfp	23	8/48	B	......	63	D	
	SHEPHERD																
107-S	1½ mi. N.	Quentes Shepherd	....	do.	610	......	......	....	do.	Olmc	......	......	C	600	61	Ir	
108	do.	do.	....	Valley	660	50	......	....	do.	Olmc	20	......	C	20	....	D,S	

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth of water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
	TYNER																
109	1½ mi. W.	Ray Moss		Valley	700	31		36	Limestone	Olmc	29	8/48	B		63	D	
	HIXSON																
110	½ mi. SW.	H. J. Hatfield		do.	680	44		36	Dolomite	O-Ck	20	8/48				Ab	
111	1½ mi. NE.	W. V. Lee	W.W.Renshaw	Slope	700	123		8	Limestone	Olmc	25		L		63	D	
112	2 mi. E.	A. C. Parker		Valley	693	91		6	do.	Olmc	12	8/48				Ab	
113	2½ mi. NE.	J. A. Shelby		do.	730	52		6	do.	Olmc	25	8/48	B		63	D	
114	4½ mi. NE.	O. A. Young		Slope	740	78		6	do.	Olmc	25		J		62	D	
115-S	do.	Mrs. J. H. Roberson		do.	715				do.	Olmc				15	61	S	
	DAISY																
116	3½ mi. SE.	Fred May		Valley	700	27		6	do.	Olmc	18	8/48				Ab	
117	3 mi. SE.	Margaret Thompson		do.	690	31		36	Dolomite	O-Ck	12	8/48	B		62	D	
118	3½ mi. SE.	Clyde Miller		do.	720	117		8	do.	O-Ck	14	8/48				Ab	
119	4 mi. S.	George Rawlston		do.	690	57		4	do.	O-Ck	19	8/48				Ab	
	HIXSON																
120	2 mi. NE.	Annie C. Smith		do.	685	95		6	Limestone	Olmc	17	8/48				Ab	
121	1 mi. S.	W. M. Harrison		Hilltop	680	63		6	do.	Olmc	43		L		62	Ab	
122	do.	S. B. Walker	W.W.Renshaw	Valley	665	216	60	8	do.	Olmc	110	8/48				Ab	Dry hole.
123	2 mi. SE.	Mrs. C. Lunsford		Slope	860	41		36	Dolomite	Ccr	23	8/48	B		62	D	Goes dry occasionally.
124	3 mi. E.	L. W. Varner		do.	760	59		36	do.	Ccr	23	8/48	B		63	D	Do.
125	3 mi. NE.	Mrs. E. Hixson		Valley	680	160		6	Limestone	Olmc	2		L	10	61	D,S	
126	3 mi. N.	Camp Tsatanagi		Slope	740	125		6	Dolomite	O-Ck	31		L			P	
127	do.	D. B. Harrel		do.	730	123		6	do.	O-Ck	68		L			D	Supplies two houses.

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth of water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
	DAISY																
128	3 mi. SW.	O. L. Fitch		Valley	680	39		6	Limestone	Mn	12	8/48				Ab	
129-S	4 mi. SW.	Cave Spring		do.	700				do.	Mn				5,000	61		
	SIGNAL MOUNTAIN																
130	1½ mi. SE.	Mrs. T. J. Rogers		do.	660	25		30	do.	Os	21	8/48				Ab	
131-S	do.	do.		do.	650				do.	Ouc				100	60	S	
	RED BANK																
132	1½ mi. W.	Coke Bowman		do.	760	100		6	Shale	MDc			L	30	61	D,S	
133	1½ mi. NW.	W. B. Johnston		do.	800	50		6	Limestone	Mfp	20		J	10	61	D,S	
134-S	do.	Morrison Spring		do.	720				Shale	MDc				500	60	S	
135-S	do.	Read Spring		do.	800				Limestone	Mn				1,000	60	S	
	SIGNAL MOUNTAIN																
136-S	3½ mi. NE.	G. F. Combs		do.	840				do.	Mn				20	60	D	
	HIXSON																
137-S	2½ mi. NW.	Vandergriff Spring		do.	770				do.	Mfp				20		D,S	
	DAISY																
138	3 mi. SW.	Ernest Summers		do.	693	97		8	do.	Mfp			L			Ab	
139	2½ mi. SW.	Burl Neely		do.	718	51		30	do.	Mn	19	8/48	B		61	D	
	CHATTANOOGA																
140	2 mi. SW.	Radio Station WDEF		Slope	660	109		6	do.	Mn			L			D	Water sample analyzed.
141	1½ mi. SW.	J. M. Pearson		Ridge	700	99		6	do.	Mfp	75		L			D	
142	1½ mi. W.	Olva M. Lane		Slope	670	21		36	do.	Mfp	13	8/48	L		62	D	
	RED BANK																
143	½ mi. N.	James B. Jones		Valley	[illegible]	43		36	do.	Mfp	[illegible]		L			Ab	
144	1½ mi. NE.	Anne E. Ford	E. O. Hembree	Hilltop	[illegible]	112		6	Dolomite	O-Ck	75		L		63	D	
145	1½ mi. E.	N. M. Wyatt		Valley	[illegible]	12		36	do.	O-Ck	21	8/48	B			Ab	

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth to water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
	LUPTON CITY																
146	1 mi. N.	C. W. Miller	......	Valley	740	25	......	36	Dolomite	O-Ck	12	8/48	B	......	....	Ab	
	RED BANK																
147	1½ mi. S.	Mrs. F. A. Lindsey	......	Slope	790	8	8	30	do.	O-Ck	2	8/48	....	......	63	Ab	
	DAISY																
148	2½ mi. SE.	W. H. Young	......	Valley	800	29	......	48	do.	O-Ck	19	8/48	B	......	62	D	
149	1½ mi. SE.	Bill Ridley	......	Ridge	860	37	......	70	do.	O-Ck	16	8/48	....	......	....	Ab	
150	2½ mi. SE.	Jim Isam	......	Valley	760	30	......	72	do.	O-Ck	13	8/48	B	......	....	S	
151	2 mi. E.	R. B. Gothard	......	do.	815	35	......	48	do.	O-Ck	18	8/48	B	......	62	D,S	
152	3 mi. E.	E. J. Gann	......	Ridge	800	28	......	48	do.	O-Ck	0	8/48	B	......	63	D	
153	2 mi. S.	C. W. Walker	......	do.	740	20	......	60	do.	O-Ck	8	8/48	....	......	....	Ab	
	SODDY																
154	In town	J. C. Owens	......	Valley	820	50	......	36	do.	O-Ck	26	8/48	B	......	....	Ab	
155	do.	T. H. Dodd	......	Slope	900	48	......	48	do.	O-Ck	16	8/48	B	......	63	D,S	
	HIXSON																
156	3 mi. N.	W. P. Selcer	......	do.	720	51	......	36	Limestone	Mn	28	8/48	B	......	62	D	
	DAISY																
157	3 mi. SW.	Earl Dunlap	......	Valley	700	50	......	48	do.	Mn	40	8/48	B	......	....	D	
158	1½ mi. SW.	J. C. Hilliard	......	Slope	720	51	......	48	do.	Mn	41	8/48	....	......	....	Ab	Well reported to go dry in summer.
159	do.	S. J. Morton	......	Hilltop	720	68	......	48	do.	Mn	55	8/48	L	......	61	P	Well supplies five houses.
160	2 mi. SW.	Southern Railway	......	Valley	700	100	......	....	Dolomite	O-Ck	......	......	L	55	....	In	
	SODDY																
161	2 mi. SE.	Lon Gann	......	do.	720	27	......	48	do.	O-Ck	17	8/48	B	......	62	D	
162	In town	Sam Parton	......	do.	720	22	......	36	do.	O-Ck	17	8/48	B	......	62	D	
163	do.	Soddy Junior High School	......	do.	720	250	......	8	do.	O-Ck	......	......	C	50	....	Ab	
164	do.	George Dyke	......	do.	770	51	......	30	Limestone	Os	10	8/48	....	......	....	Ab	
165	do.	Soddy-Daisy High School	......	do.	860	200	......	8	Dolomite	O-Ck	......	......	....	......	....	Ab	
166-S	½ mi. E.	Wallace Spring	......	do.	675	......	......	....	do.	O-Ck	......	......	....	2,000	....	....	Spring covered by Chickamauga Reservoir except at very low stages.
167	3 mi. NE.	W. C. Coleman	......	do.	760	36	......	30	do.	O-Ck	9	8/48	B	......	62	D	
168	2 mi. E.	Frank Bennett	......	do.	780	38	......	75	do.	O-Ck	10	8/48	L	......	63	D,S	Well reported to go dry every 4 or 5 years.
169	2 mi. N.	John Lynch	......	do.	770	30	......	24	do.	O-Ck	15	8/48	B	......	63	S	
170	3 mi. NE.	Martha Coleman	......	Ridge	790	43	......	72	do.	O-Ck	16	8/48	B	......	....	D	Well reported to flow in winter.
	SIGNAL MOUNTAIN																
171-1	2 mi. NE.	Foster Hampton	......	Plateau	1,800	38	......	36	Sandstone	Mp	25	8/48	B	......	....	D	
171-2	do.	do.	Marshal Ruth	do.	1,840	122	......	6	do.	Pu	30	......	J	......	....	D	
172-1	3½ mi. NE.	Howard Richardson	......	do.	2,050	61	......	6	do.	Pu	7	8/48	B	......	....	D,S	
172-2	do.	do.	......	do.	2,050	47	......	6	do.	Pu	4	8/48	B	......	....	D,S	
173	4 mi. N.	N. A. Welch	Evans Bros.	do.	2,030	87	30	6	do.	Pu	34	8/48	B	......	....	D	
174-1	3 mi. NE.	A. D. Miles	......	Ridge	1,940	40	7	6	do.	Pu	20	8/48	B	......	....	D	
174-2	do.	do.	......	do.	1,960	81	14	6	do.	Pu	25	8/48	....	......	....	D	
175-1	2 mi. N.	Mountain Land Co.	......	Plateau	1,620	275	......	8	do.	Pu	......	......	....	......	....	Ab	Wells 175-1 through 5 were formerly used by Town of Signal Mountain for public supply. Drought of 1925 caused abandonment of wells.
175-2	do.	do.	......	do.	1,640	275	......	8	do.	Pu	......	......	....	......	....	Ab	
175-3	do.	do.	......	do.	1,660	275	......	8	do.	Pu	5	8/48	....	......	....	Ab	
175-4	1 mi. NE.	do.	......	do.	1,900	275	......	8	do.	Pu	......	......	....	......	....	Ab	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		8	do.	Pu	......	......	....	......	....	Ab	

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth to water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
176-1	HARRISON 4½ mi. NE.	Charles Wooden	W.W.Renshaw	Slope	720	135	......	6	Shale	Ꞓc	40	......	L	2-3	......	D,S	
176-2	do.	do.	......	do.	710	37	......	24	Dolomite	OꞒk	......	......	......	......	......	Ab	Well reported to have been dug to a depth of 90 feet without encountering water.
177	5½ mi. NE.	Ochoee Baptist Assn.	Ed Wooten	do.	720	77	......	6	Shale	Ꞓc	40	......	J	......	......	P	
178	DAISY 7½ mi. E.	W. H. Leaman	H. L. Carlson	Hilltop	900	201	180	6	Dolomite	OꞒk	180	......	L	5	62	D	
179-S	HARRISON 3½ mi. E.	TVA	......	Valley	680	......	......	......	do.	OꞒk	......	......	......	......	......	......	Discharge measurement Nov. 6, 1947: 6.30 cfs. Water sample analyzed.
180-S	GEORGETOWN 5 mi. SW.	Anderson Spring	......	do.	750	......	......	......	do.	OꞒk	......	......	......	1,000	......	D	Water sample analyzed.
181	McDONALD 7 mi. NW.	Sadie Davis	Ed Wooten	Slope	775	59	60	6	do.	OꞒk	26	8/48	B	......	......	D	
182	GEORGETOWN 5½ mi. SW.	W. P. Goodner	do.	Valley	760	62	......	6	do.	OꞒk	30	......	J	......	......	D	
183	7 mi. SW.	R. L. Munger	do.	Hilltop	800	70	......	6	do.	OꞒk	68	8/48	B	......	61	D,S	
184	McDONALD 6 mi. NW.	W. W. Varnell	......	Valley	720	40	......	4	Limestone	Olme	24	8/48	B	......	62	D,S	
185	do.	Snow Hill School	......	do.	715	100	......	6	do.	Olme	......	......	C	......	......	P	Well supplies water for 300 students.
186	HARRISON 4½ mi. NE.	William Kobbet	H. L. Carlson	Slope	730	96	90	6	Dolomite	OꞒk	45	......	C	......	......	D	Water sample analyzed.
187	5½ mi. N.	W. J. Lackey	......	Valley	720	22	......	24	Shale	Ꞓc	17	9/48	B	......	......	D	
188	McDONALD 6 mi. NW.	Ted Leaman	......	Hilltop	800	72	36	6	Dolomite	OꞒk	40	......	J	......	......	D,S	
189-1	5 mi. NW.	William S. Davis	H. L. Carlson	Valley	720	42	30	6	Limestone	Olme	13	......	J	......	61	D	
189-2	5 mi. NW.	do.	......	do.	720	37	......	8	do.	Olme	20	9/48	......	......	......	Ab	
190-1	do.	J. B. Hall	Green	do.	730	67	17	6	do.	Olme	16	9/48	B	......	62	Ab	Water black with sulfur odor. Water sample analyzed.
190-2	do.	do.	do.	do.	730	62	15	6	do.	Olme	40	9/48	B	......	62	D	Water has sulfur odor.
191	6 mi. N.	Ben Lee	H. L. Carlson	do.	730	92	......	6	do.	Olme	51	9/48	B	......	......	D	Static water level reported prior to 1946 to be about 10 feet.
192	4½ mi. NW.	T. D. Wrinkle	Ed Wooten	do.	730	72	......	6	do.	Olme	17	......	L	......	......	D	Water has sulfur odor.
193	OOLTEWAH 5 mi. N.	Frank Kelly	......	do.	720	100	......	6	do.	Olme	......	......	C	10	......	D	
194	HARRISON 7 mi. NE.	N. F. Fine	......	do.	800	19	......	36	Dolomite	OꞒk	10	9/48	B	......	61	D	
195	6½ mi. NE.	J. W. McDaniel	H. L. Carlson	Slope	780	102	98	6	do.	OꞒk	60	......	J	......	......	D	
196-1	SODDY 5 mi. E.	E. M. Cross	do.	Hilltop	710	80	40	6	do.	OꞒk	38	9/48	B	......	62	D	
196-2	do.	do.	......	do.	710	28	30	24	do.	OꞒk	......	......	......	......	......	Ab	Dry hole.
197	5 mi. SE.	James Powell	Ed Wooten	Slope	700	81	30	6	do.	OꞒk	30	......	C	......	......	D	
198	BIRCHWOOD 5½ mi. SW.	G. D. Eldridge	H. L. Carlson	Hilltop	760	113	110	6	do.	OꞒk	75	9/48	B	......	......	D,S	
199	3½ mi. SW.	T. J. Latham	Ed Wooten	Valley	745	53	......	6	Shale	Ꞓc	30	9/48	L	10	......	D,S	

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth to water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
	SODDY																
200	6½ mi. E.	A. G. Moon	Ed Wooten	Hilltop	820	126	127	6	Shale	Ꞓc	104	9/48	B	....	....	D	
201	6 mi. E.	W. D. Malone	do.	Valley	760	60	30	6	do.	Ꞓc	25	....	C	....	....	D	
	DAISY																
202	4½ mi. SE.	J. O. Neyman	....	do.	750	44	44	24	Dolomite	O-Ꞓk	16	....	B	....	....	D	
203	5½ mi. E.	H. C. Clift	....	do.	710	40	....	36	do.	O-Ꞓk	10	....	L	....	61	D	
204	4 mi. E.	J. R. Clift	Halo	Hilltop	820	137	100	6	do.	O-Ꞓk	65	....	C	....	....	D	
	SODDY																
205	3½ mi. E.	Eldridge Heirs	....	Slope	780	44	....	24	do.	O-Ꞓk	19	9/48	....	....	....	Ab	Water sample analyzed.
206	4 mi. E.	G. M. Lee	E. O. Hembree	Hilltop	760	159	....	6	do.	O-Ꞓk	90	9/48	B	....	61	D	
207	5 mi. E.	Chattanooga Fly & Bait Casting Club	do.	Slope	720	70	....	6	do.	O-Ꞓk	....	....	L	....	60	P	
	SALE CREEK																
208	3 mi. E.	TVA	....	do.	700	53	....	48	do.	O-Ꞓk	22	9/48	....	....	....	Ab	
209-1	2½ mi. SE.	Mrs. Ernest Hancock	E. O. Hembree	do.	740	96	95	6	do.	O-Ꞓk	58	9/48	B	....	....	D	
209-2	do.	do.	....	do.	738	42	....	36	do.	O-Ꞓk	24	9/48	....	....	....	Ab	
	BAKEWELL																
210	1 mi. SE.	Dale Price	....	do.	710	53	....	6	do.	O-Ꞓk	13	9/48	B	....	61	D	
211	do.	Bruce Hunt	....	do.	730	100	....	6	do.	O-Ꞓk	....	....	L	10	....	D,S	
	McDONALD																
212	2 mi. SW.	Reece Ramsey	....	do.	910	92	....	6	Shale	Sr	75	9/48	B	....	....	D	
213-S	do.	George W. Poe	....	do.	930	....	....	....	do.	Or	....	....	....	10	....	P	
	OOLTEWAH																
214	2 mi. E.	O. D. McKee	....	Hilltop	820	100	....	6	Limestone	Mn	....	....	L	....	62	D	
	APISON																
215	3 mi. E.	H. L. McCulley	H. L. Carlson	Slope	960	64	64	6	Shale	Ꞓc	....	....	C	....	....	D	Well reported to flow in winter.
216	2 mi. E.	J. L. Lawson	do.	do.	960	77	....	6	do.	Ꞓc	20	....	C	....	....	D	
	LUPTON CITY																
217-1	1½ mi. NE.	Dupont Chattanooga Nylon Plant	C. C. Arnold	do.	675	420	....	8	Limestone	Olmc	20	....	....	56	....	Ab	Test hole. Reported drawdown of 190 feet after 4 hours pumping at 56 gpm.
217-2	1 mi. E.	do.	do.	do.	670	140	....	8	do.	Olmc	40	....	....	50	....	Ab	Test hole. Reported drawdown of 70 feet when pumping at 50 gpm.
218	1½ mi. NE.	M. H. Hinch	....	do.	670	139	....	6	do.	Olmc	22	1/44	....	....	....	D	
	SALE CREEK																
219	In town	E. J. Reedley	....	do.	765	22	....	36	do.	Mn	10	....	B	....	....	D	
220	do.	D. D. Lane	....	Valley	745	30	....	6	do.	Mn	....	....	J	....	....	D	
221	2 mi. N.	Sallie Miller	....	do.	710	30	....	30	do.	Mn	22	4/49	B	....	....	D	
222	2 mi. NE.	Frank Thomas	....	Slope	830	60	....	30	Dolomite	O-Ꞓk	45	....	B	....	....	D	
	BIRCHWOOD																
223	3½ mi. NW.	D. W. Fox	....	do.	750	32	....	36	do.	O-Ꞓk	25	....	B	....	....	D	
224	do.	J. Merle Crawley	....	Valley	750	50	....	36	do.	O-Ꞓk	45	....	B	....	....	D	Considerable seasonal variation in water level.
	GRAYSVILLE																
225	2 mi. SE.	Eugene Morgan	....	Slope	800	25	....	36	do.	O-Ꞓk	19	....	B	....	....	D	Well goes dry every fall.
226	1 mi. S.	Mrs. J. E. Lowery	....	do.	760	60	....	48	Limestone	Mn	....	....	J	....	....	D	
	BIRCHWOOD																
227	½ mi. E.	A. R. Brown	....	Valley	780	50	20	6	Shale	Ꞓc	30	....	J	....	....	D	
228	1½ mi. SE.	Tom McKinney	....	do.	765	31	....	3	Dolomite	O-Ꞓk	15	6/49	B	....	....	D	
229	2 mi. S.	J. W. Smith	....	Slope	805	39	....	48	do.	O-Ꞓk	21	6/49	B	....	....	D	
230	2½ mi. SE.	Jess Staton	....	Valley	735	14	....	30	Limestone	Olmc	13	6/49	B	....	....	D	Water from well gets muddy after rain.

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

Well or spring No.	Location with reference to nearest post office	Owner or name	Driller	Topographic situation	Altitude (feet)	Depth of well (feet)	Length of casing (feet)	Diameter (inches)	Probable water-bearing beds: Character of material	Probable water-bearing beds: Geologic horizon	Depth to water level (feet)	Date of measurement	Method of lift	Yield (gallons per minute)	Temperature (°F.)	Use of water	Remarks
	GEORGETOWN																
231	3 mi. NW.	Cranfield	.....	Valley	860	19	.....	48	Dolomite	OꞒk	2	6/49	B	.....	.....	D	Well goes dry every fall.
232	2½ mi. W.	H. W. Bettis	.....	Slope	875	20	.....	43	do.	OꞒk	18	6/49	B	.....	.....	D	
233	2½ mi. SW.	J. N. Gannaway	.....	Valley	830	30	.....	20	Limestone	Oue	27	.....	B	.....	.....	D	
234	In town	Charles T. Harris	Martin Zigler	do.	810	58	18	6	do.	Oue	20	.....	J	.....	.....	D,S	
	SALE CREEK																
235	1 mi. W.	John Campbell	.....	do.	795	14	.....	36	Sandstone	Pu	12	6/49	B	.....	.....	D	
236	3 mi. NW.	David Gallion	.....	Slope	1,645	41	.....	6	do.	Pu	30	6/49	B	.....	.....	D	
237	3½ mi. NW.	S. E. Gann	E. O. Hembree	do.	1,765	100	15	6	do.	Pu	25	.....	B	.....	.....	D	
	GRAYSVILLE																
238	4½ mi. W.	Cocy Standifer	do.	do.	1,862	60	20	6	do.	Pu	25	.....	L	.....	.....	D	
	SALE CREEK																
239	½ mi. E.	Sale Creek School	.....	Valley	730	60	.....	36	Limestone	Mn	.....	.....	J	.....	.....	P	Water sample analyzed.
	BAKEWELL																
240	½ mi. S.	Bakewell School	.....	do.	710	50	.....	36	Dolomite	OꞒk	4	.....	J	.....	.....	P	Do.
241	4 mi. SE.	Mt. Tabor School	.....	Slope	755	60	.....	6	do.	OꞒk	27	.....	B	.....	60	P	Do.
	DAISY																
242-S	1½ mi. NE.	Cold Spring	.....	Valley	735	.....	.....	.....	Limestone	Os	.....	.....	.....	3	55	D	Do.
	HIXSON																
243	4½ mi. NE.	Gold Point School	.....	Slope	695	30	.....	36	do.	Olme	.....	.....	L	.....	60	P	Do.
244-S	2 mi. SE.	Gold Point Spring	.....	do.	670	.....	.....	.....	do.	Oue	.....	.....	.....	1,000	58	.....	Water turbid. Water sample analyzed.

TABLE 37.—ANALYSES OF GROUND WATER IN HAMILTON COUNTY

(Chemical constituents in parts per million)

Well or spring No.	Owner or name of spring or well	Geologic horizon	Date of collection	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na & K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Hardness as $CaCO_3$	Specific Conductance (Micromhos at 25°C.)	pH
5	Fisherman's Headquarters	OꞒk	12/17/48	0.03	141	32	43	0	406	133	75	.....	.....	484	1018	7.3
9	J. H. Allison & Co.	Sr	12/16/48	.02	84	14	14	0	254	46	30	.....	.....	267	554	7.3
15-2	American Cyanamid Co.	MDe	12/10/48	.08	25	7.9	3.4	0	118	1.0	3.2	.....	.....	05	202	7.6
20-1	Chattanooga Medicine Co.	Mn	12/16/48	.17	51	13	51	0	194	105	16	.....	.....	181	542	8.0
23-1	Chattanooga Area Milk Producers Assn.	Olme	12/18/48	26	.....	.....	.....	.....	354	11	27	.....	.....	192	628	7.8
41	Bonny Oaks School	On	12/16/48	.07	18	7.2	1.6	0	84	4.0	3.5	.....	.....	74	142	8.0
46	Hamilton County Hospital	Ꞓc	12/16/48	.01	39	1.1	.9	0	118	1	4.2	.....	.....	102	210	7.7
48	Southern Jr. College	Mfp	12/15/48	.14	21	6.1	11	0	52	53	3.0	.....	.....	78	170	7.0
49	Meadowlake Country Club	OꞒk	12/18/48	.02	29	13	5.1	0	139	3	5.0	.....	17	126	259	7.5
140	Radio Station WDEF	Mn	12/18/48	28	13	4.8	24	0	93	5.0	14	.....	.....	52	199	6.8
179-S	TVA	OꞒk	12/16/48	.04	21	10	1.4	0	111	2	2.5	.....	.....	93	170	7.8
180-S	Anderson Spring	OꞒk	12/16/48	.05	18	5.1	4.7	0	86	2	2.5	.....	.....	60	146	7.1
186	William Kobbett	OꞒk	12/10/48	.02	23	11	3.1	0	128	1	2.5	.....	.....	103	195	7.8
190-1	J. B. Hall	Olmo	9/ 1/48	.....	.....	.....	.....	.....	493	173	080	.....	0	97	3071	7.6
205	Eldridge Heirs	OꞒk	1/10/50	.14	16	3.3	1.2	0	47	5	8.5	0.1	.....	53	121	7.8
239	Sale Creek School	Mn	1/19/50	.22	4.8	2.3	3.6	0	17	0	4.2	0	.....	21	73.3	6.8
240	Bakewell School	OꞒk	1/19/50	.13	41	15	10	0	215	7	2.2	0	.....	164	339	8.2
241	Mt. Tabor School	OꞒk	1/19/50	.14	42	11	.8	0	174	4	2.8	0	0.9	150	273	8.2
242-S	Cold Spring	Os	1/19/50	.06	2.1	0.7	3.8	0	5	6	3.5	0	1.5	8	33.8	5.8
243	Gold Point School	Olme	1/19/50	.77	76	24	19	0	242	106	14	0	.....	288	616	8.1
244-S	Gold Point Spring	Oue	1/19/50	.33	58	6.3	2.1	0	188	7	6.0	.1	6.4	171	298	8.4

Site No. TND 003327251

Reference No. 2

D.M Steward Co.

Chattanooga, Tn.

17 October 1985

VERNON McMILLAN Inc.

THE ROYAL LINE

INTRO: D.M. Steward Co.
E. 36TH St & Jerome Av.
Chattanooga, Tn
17 Oct 85

* Arrive location 0916 EST 17 Oct 85

* Met w/ John Woody, D.M. Steward Co. & David Holt, D.M. Steward Co. from 0920 to 1000 EST

* We will split samples w/ D.M. Steward

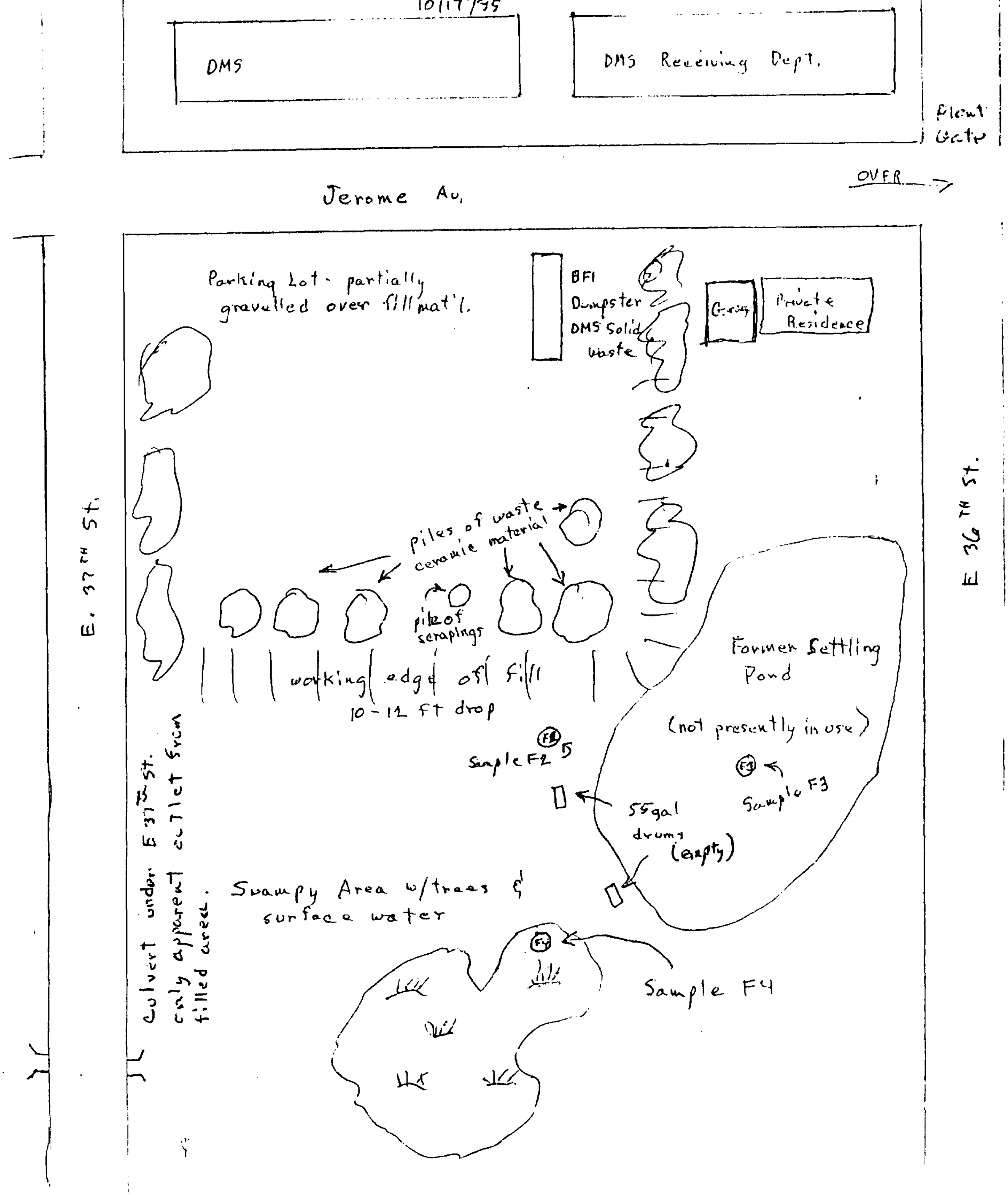
* 1000 to 1035 EST - walkaround of site
present. Riley Castleberry - maintenance supv. DMS
David Holt. plant mgr. DMS
Walker Jowell TDSWM
Janet Eldridge "
S.S. Carruthers "

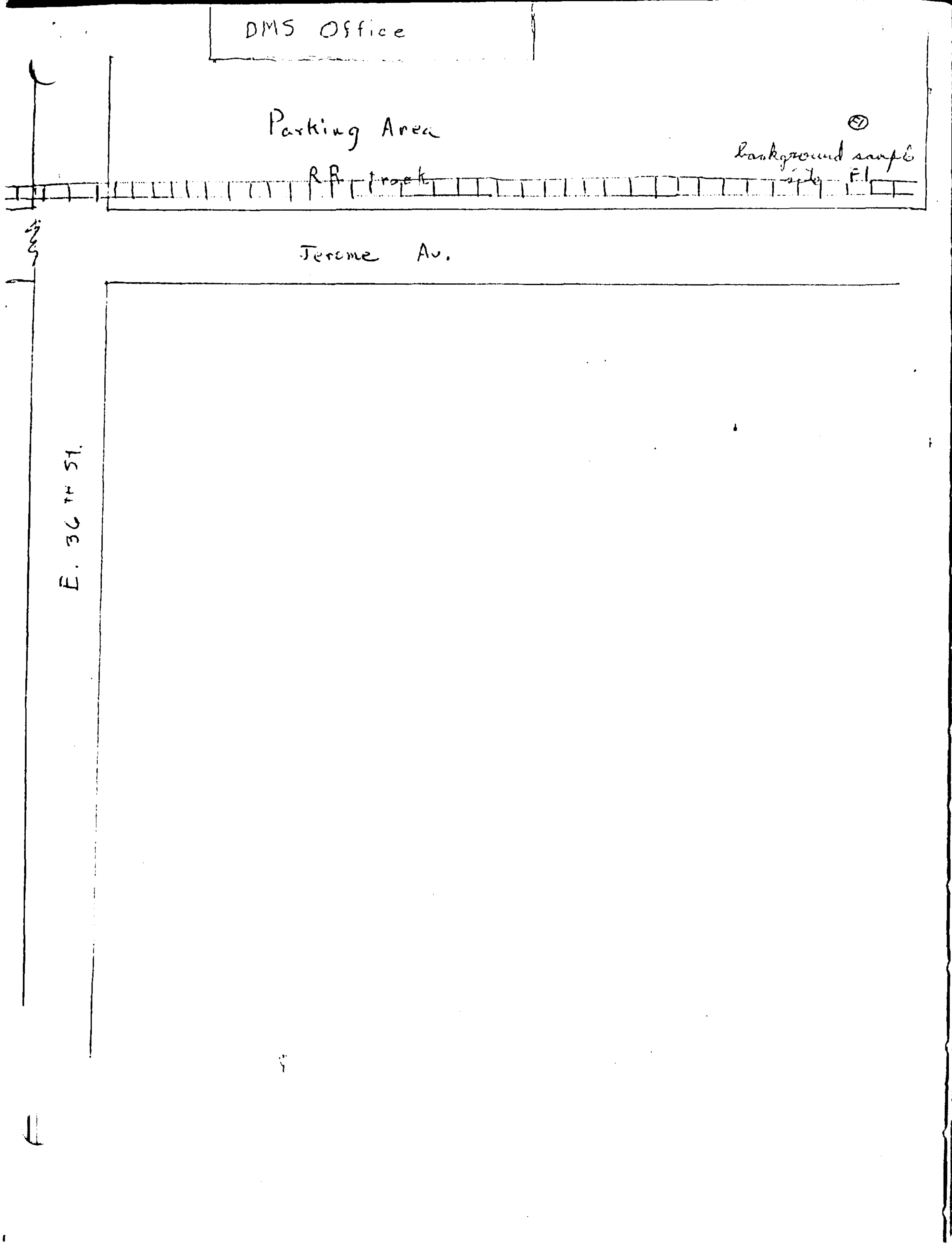
* Weather - sunny, 75°-80° F.

* Begin sampling apx 1030 hr 17Oct85

* Sampling completed apx 1345 hr 17Oct85

SITE SKETCH - D.M. STEWARD (not to scale)
Chattanooga, Tenn
10/17/95





DMS Office
Parking Area
F1
background sample site F1
RR track
Jerome Av.
E. 36th St.

\#1 - Field #1 WFH taking background sample - 50' E. of office
note: this site rejected due to presence of coal in soil - moved to 150' E of office bldg.

\#2 - Field #1 WFH & JEE taking background sample F1
1035

\#3 - WFH & JEE deconning shovel & spoon after sample F1
1045 EST

\#4 - Field #2 WFH taking F2 1205 EST

\#5 - Detail of F2 showing blue-tinged liquid - 6' below surfa[ce]
1205 EST

\#6 - WFH decon sample spoon & shovel after F2 - 1213 E[ST]

\#7 - WFH compositing sample F3 . 1228 EST

\#8 - detail of hole F3 showing strata of blue/orange deposits 1230 EST

\#9 - 1240 EST - WFH decon spoon & shovel after sample F[3]

—— begin new roll KVR 400-24 ——

\#10 - 1255 EST - WFH taking water sample F4

\#11 1257 EST - WFH & JEE bottling sample F4

\#12 View of old settling pond area - David Holt & Riley Castleberry - 1305 EST

SAMPLING LOG

Field # 1: time ~~1135~~ EST 1135 [illegible]

Background sample taken by WFH & JEE 150 ft E of office building - depth 5". spoon soil sample into 1 plastic cont.

Field # 2: time 1205 EST

Soil sample from 10' SE of fill edge - blue deposits of blue-tinged liquid 6" below G.L. - groundwater 6" below GL - note this area on Hamilton Concrete property

Field # 3: time 1228 EST

Depth composite 0" - 18" in settling pond area 50' NE of fill edge - duplicate sample taken here - Hamilton concrete property

Field # 4: time 1255 EST

Water sample from swamp pond on Hamilton Concrete property - 50' from fill edge.

State of Tennessee
Department of Health and Environment
Division of Solid Waste Management

SAMPLERS: (Signature) Janet E. Eldridge
Walker T. Howell

Split Samples Offered — D. M. Steward (✓) Accepted — Hamilton Concrete (✓) Declined

Name of Facility/Site: D. M. Steward and Hamilton Concrete

Facility/Site Location: 37th Street E and ~~Jeffrey~~ Jerome St. Chattanooga, TN

FIELD NUMBER	DATE	TIME	COMP	GRAB	SPLIT SAMPLES	SAMPLE IDENTIFICATION	NO OF CONTAINERS	REMARKS
1	10/17/85	1135		✓	yes	Background Soil	~~2~~ 3	metals & organics
2	10/17/85	1200		✓	yes	Toe of parking lot	~~2~~ 3	"
3.	10/17/85	1235	✓		yes	Swampy area	~~3~~ 4	" & duplicate organics
4	10/17/85	1300		✓	yes	Standing water	5	metals & organics

Transferred by (Signature): Janet E. Eldridge

Date: 17 October 1985

Time

Received by (Signature): [illegible] Oct 17 1985

Telephone

Title: [illegible]

Date: Oct 17 1985

Time

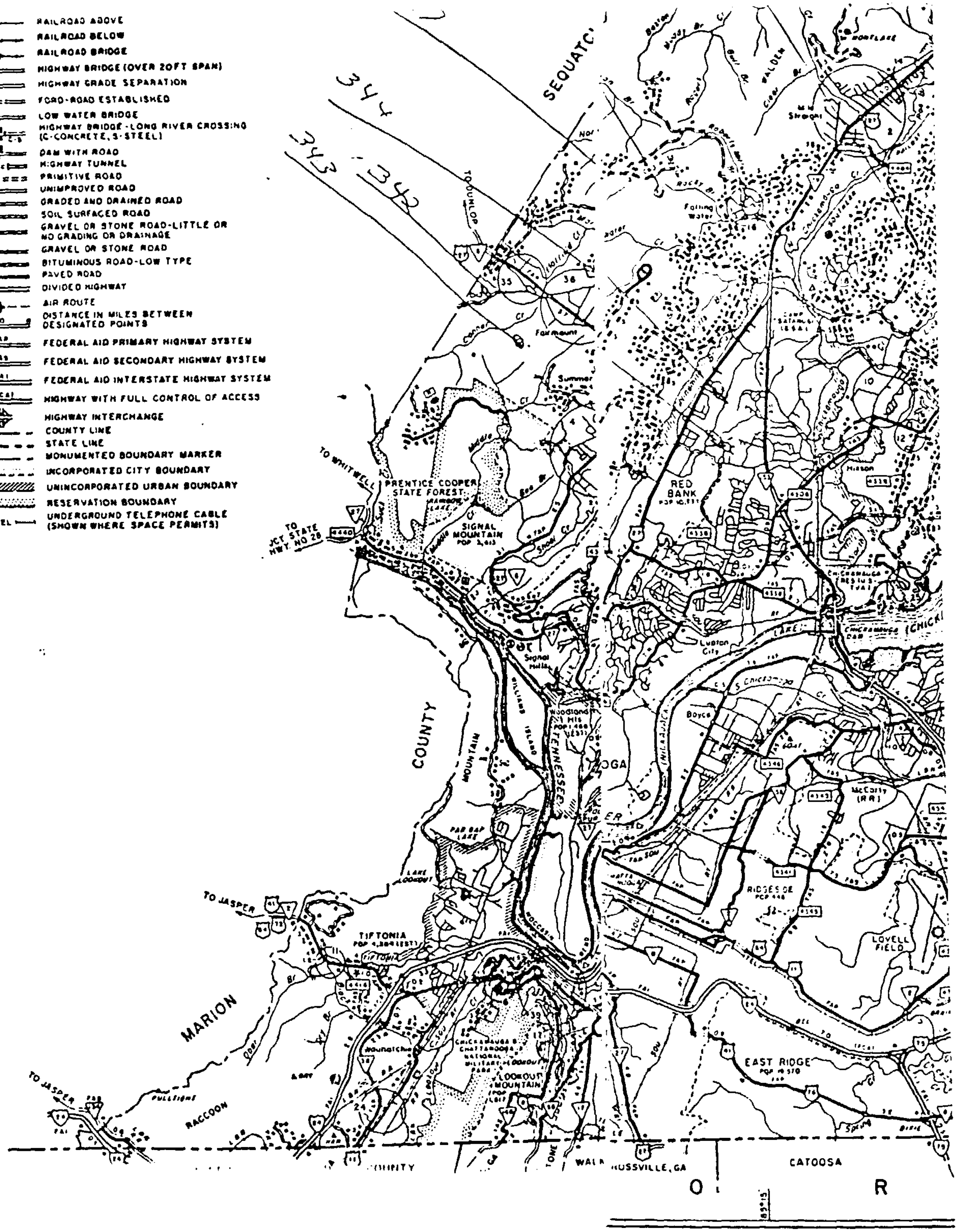
Distribution: Original to Coordinator Field Files: Copy to Facility/Site Representative

Site No. TND 003327251

Reference No. 3

HEALTH CENTER
TELEVISION STATION (WITH CALL LETTERS)
ROADSIDE SPRING
BOOSTER STATION
COUNTY PRISON CAMP
GARAGE (SP-STATE PARK)
FIRE ENGINE HOUSE
SAWMILL
QUARRY
GRAVEL PIT
NURSERY
WAREHOUSE (NUMERALS ADDED INDICATE A GROUP)
GREEN HOUSE
PUMPING STATION (OIL OR GAS)
AIRPORT BOUNDARY, WITH RUNWAYS
AIRPORT, COMPLETE FACILITIES
LANDING AREA OR STRIP
CAMP OR LODGE
BALL PARK OR PLAY GROUND
BATHING BEACH OR SWIMMING POOL
CAMP SITE OR TRAILER PARK
AUDITORIUM
GOLF GROUND OR COUNTRY CLUB
GYMNASIUM
MESS HALL
RECREATION HALL
TRIANGULATION STATION
MONUMENT
OBSERVATION OR LOOKOUT TOWER
COUNTY SEAT
OTHER CITIES AND VILLAGES
POWER SUBSTATION
WATER SUPPLY STANDPIPE
GAUGING OR PUMPING STATION
FILTRATION PLANT
REFUSE, GARBAGE OR TRASH DUMP
AUTOMOBILE GRAVEYARD
SCRAP METAL JUNKYARD

RAILROAD ABOVE
RAILROAD BELOW
RAILROAD BRIDGE
HIGHWAY BRIDGE (OVER 20FT SPAN)
HIGHWAY GRADE SEPARATION
FORD-ROAD ESTABLISHED
LOW WATER BRIDGE
HIGHWAY BRIDGE-LONG RIVER CROSSING (C-CONCRETE, S-STEEL)
DAM WITH ROAD
HIGHWAY TUNNEL
PRIMITIVE ROAD
UNIMPROVED ROAD
GRADED AND DRAINED ROAD
SOIL SURFACED ROAD
GRAVEL OR STONE ROAD-LITTLE OR NO GRADING OR DRAINAGE
GRAVEL OR STONE ROAD
BITUMINOUS ROAD-LOW TYPE
PAVED ROAD
DIVIDED HIGHWAY
AIR ROUTE
DISTANCE IN MILES BETWEEN DESIGNATED POINTS
FEDERAL AID PRIMARY HIGHWAY SYSTEM
FEDERAL AID SECONDARY HIGHWAY SYSTEM
FEDERAL AID INTERSTATE HIGHWAY SYSTEM
HIGHWAY WITH FULL CONTROL OF ACCESS
HIGHWAY INTERCHANGE
COUNTY LINE
STATE LINE
MONUMENTED BOUNDARY MARKER
INCORPORATED CITY BOUNDARY
UNINCORPORATED URBAN BOUNDARY
RESERVATION BOUNDARY
UNDERGROUND TELEPHONE CABLE (SHOWN WHERE SPACE PERMITS)



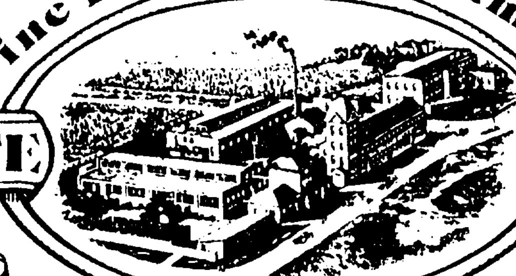
Site No. TND 003327251

Reference No. 4

76-063

MAY 5 1976

Fine Technical Ceramics



SINCE 1876

D. M. STEWARD MFG. CO.

May 3, 1976

File
D. M. Steward
Mfg. Co.
Ind 1976
Hamilton

cc: WQC-Nash
To Bob O'Neill

Mr. Philip L. Stewart, Environmental Engineer
Water Quality Control Division
Tennessee Department of Public Health
Southeast Regional Health Office
2501 Milne Avenue
Chattanooga, TN 37406

Dear Mr. Stewart:

As you are aware, D. M. Steward has been utilizing the pond adjacent to Jerome Street as a settling basin for suspended solids. The pond discharges through a culvert under 37th Street and thence to a tributary of the Tennessee River. This is described on Enclosure 1, a sketch of the site and then "proposed area" in 1972. This has not been satisfactory and will not meet the requirements of the 1976 conditions of our permit (TN0004774).

A new system has been developed and will be ready for initiation the week of May 2, 1976. A plan description of this process is offered in Enclosure 2. This system separates the runoff from rainwater and the process water wastes and provides for filtration of the latter. Process water, so treated, will then be either re-used or discharged to the sanitary sewer. The runoff from rainwater will be the only discharge from D. M. Steward into the pond noted on Enclosure 1 once the system is operable.

Enclosure 2 describes the discharge routes for both the runoff and process waste water. All waste water related to the process is diverted to the 16,000 gallon collection tank for holding and subsequent filtration. Enclosures 3 & 4 describe in detail the tank and its agitating system. Current flow of waste water is approximately 5,000 gallons per day. Maximum flow could reach 7,500 gallons, but this is not anticipated. The filtration unit is designed to handle 10,000 gallons per day.

The waste slurry will be lifted from the collection tank with a Warren-Rupp SA2-A double acting diaphragm pump (see Enclosure 5) and pumped through the Shriver Model 24 Plate and Frame Pressure Filter. A description of this unit is provided in Enclosure 6.

The filtrate discharged from the filter will be either emptied into the sanitary sewer (see discharge point on Enclosure 2) or piped to a storage tank for re-use.

Performance tests were made both at the Shriver Company and D. M. Steward to test the effectiveness of this type filter on the same slurry which will be handled by the production unit. The tests were satisfactory.

Enclosures 7 & 8 describe the testing procedures leading to the specification of the filtration unit. The tests by Shriver were primarily of a nature to specify the unit type and size. Those run by Steward were to evaluate the selection from the standpoint of performance (capability and efficiency). TSS was very satisfactory on the evaluation conducted at Steward (note results, Enclosure 8).

A comparison of analyses of the water at the Jerome Street discharge and at the 37th Street culvert, which is reported quarterly to EPA, is shown on Enclosure 9. This indicates that, with the solids reduced to a satisfactory level, other parameters (BOD_5, COD, NH_3, and pH) are well within the 1976 requirements at the Jerome Street discharge. Accordingly, D. M. Steward respectfully requests that the State of Tennessee allow it to begin utilizing the system described in time for compliance with its permit expiration of May 31, 1976.

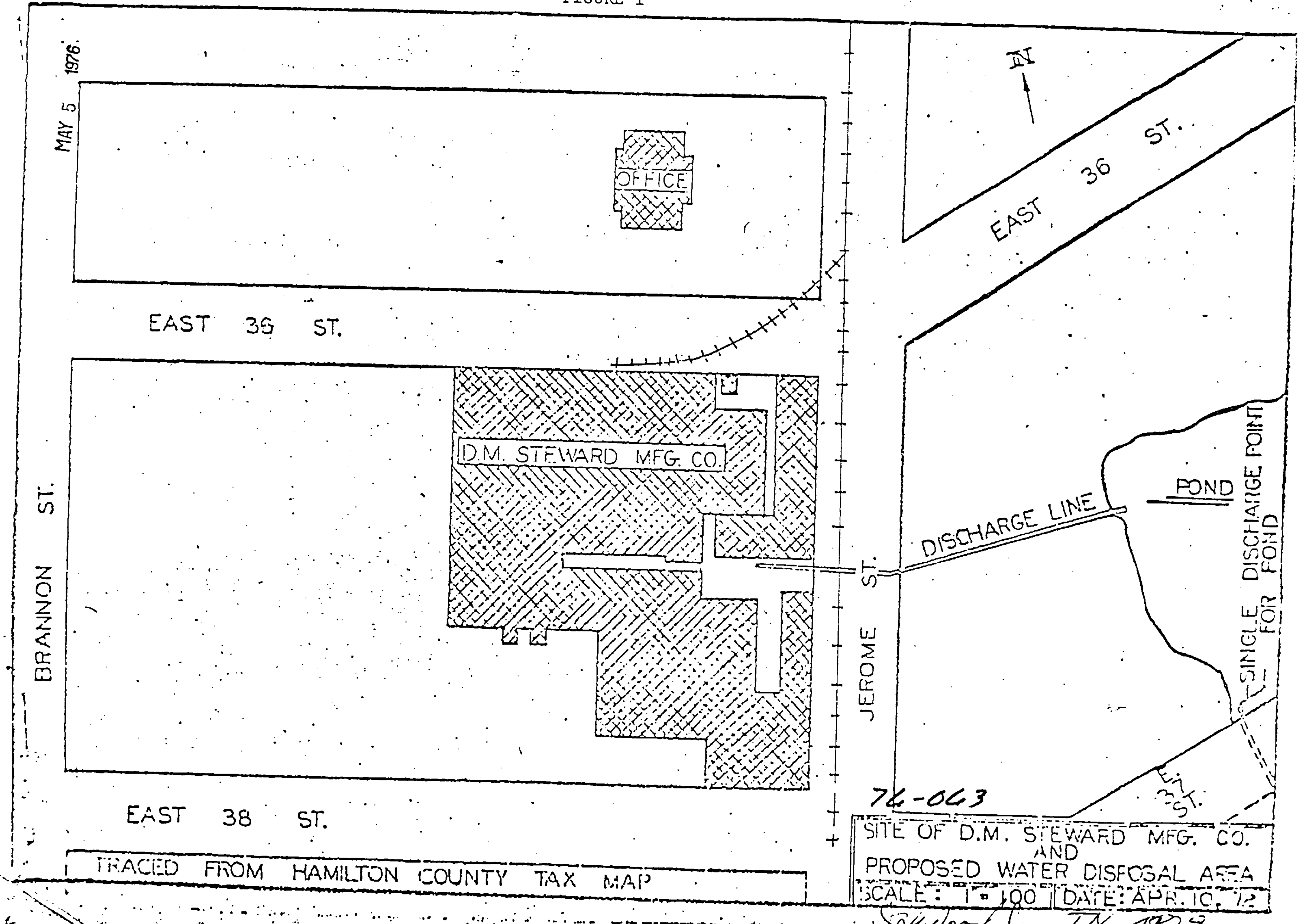
NOTE

Yours very truly,

John H. Woody, Jr.
Vice President of Engineering
(State of Tennessee License No. 4829)

JHWjr/ds
9 Enclosures

FIGURE 1



MAY 5 1976
OFFICE
N
EAST 36 ST.
EAST 36 ST.
D.M. STEWARD MFG. CO.
DISCHARGE LINE
POND
SINGLE DISCHARGE POINT FOR POND
BRANNON ST.
JEROME ST.
E. 37 ST.
EAST 38 ST.
TRACED FROM HAMILTON COUNTY TAX MAP
76-063
SITE OF D.M. STEWARD MFG. CO. AND PROPOSED WATER DISPOSAL AREA
SCALE: 1" = 100'
DATE: APR. 10, 72

Site No. TND 003327251

Reference No. 5

MAR 31 1976

76-063

D · M · STEWARD · MANUFACTURING · COMPANY

CHATTANOOGA TENNESSEE

LAVA STEATITES

LAVITE

TECHNICAL CERAMICS

FERRITES TITANATES

PERMANENT MAGNETS

JRM 4/1
JGM
LP
CAS
PLS

March 30, 1976

Review — 108

File D. M. Steward Mfg. Co. IW 1976 Hamilton

Mr. V. Wayne McCoy, Chief
Monitoring and Enforcement Section
Division of Water Quality Control
Tennessee Department of Public Health
Nashville, TN 37219

Dear Mr. McCoy:

Plans for the treatment of process wastewater are described below and in the attached facility layout. While the construction of the treatment facility is progressing and the filtration equipment is on hand, no connection to the Chattanooga municipal sewerage system will be made until approval from you or your representative is granted.

As described on the attached layout, all process water generated by the operation will be received through discharge drains (1), (2), and (3) into a 15,000 gallon, agitated collection tank. The tank is reinforced concrete. The tank capacity is such that it can contain slightly greater than a two day supply of wastewater at maximum plant operation. Filtration will be handled by a Shriver Model 24 Polypropylene Plate and Frame Pressure Filter. The designed filtration rate of 42 gallons per minute (the average slurry concentration to be approximately 0.5% solids) will allow the unit to be cycled quickly, once per day.

Selection of this type filtration system was made, based on tests run with typical slurry from the same source as the production unit will handle, both at Shriver and at D. M. Steward. Results were obtained on a wide range of solids concentrations (0.4% to 20.0%) and on a wide range of flow rates. Filtrate clarity at the designed rate on the test unit operated at Steward was excellent, running only 2 mg/l TSS. The maximum TSS recorded on all tests was 10 mg/l.

The filtrate from the unit will be directed to the Chattanooga municipal sewer system (upon approval of the Division of Water Quality Control) or it may be stored for re-use. Storage tanks for this purpose are not ready at this time, nor is the piping system. Approval by the Chattanooga Department of Streets and Sewers has been made for this connection.

In order to dispose of natural runoff from roof guttering, extensive repiping is being affected which will carry rain water from this source only to the current discharge point at the time the filtration unit is activated.

It is my impression that at the time of activation and satisfactory performance of the system, both the Division of Water Quality Control Temporary Permit 75-159 and the EPA Permit NPDES No. TN0004774 may be removed.

D. M. Steward appreciates the assistance given by the Division, and we do believe we will be in full compliance with the system activation.

Yours very truly,

John H. Woody, Jr., P.E.
Vice-President, Engineering
(Tenn. Reg. No. 4829)

JHWjr/ds
Enclosure

cc: Mr. Jack R. McCornick, Basin Chief
Division of Water Quality Control
Southeast Regional Health Offices
2501 Milne Avenue
Chattanooga, TN 37406

Mr. Robert W. Ruch, P.E.
Chief, KY/TN Compliance Group
Water Enforcement Branch
Enforcement Division
United States Environmental Protection Agency
1421 Peachtree Street, N.E.
Atlanta, GA 30309

Site No. TND 00332-7251

Reference No. 6

Local Climatological Data

Annual Summary With Comparative Data

1981

CHATTANOOGA, TENNESSEE

Narrative Climatological Summary

Chattanooga is located in the southern portion of the Great Valley of Tennessee, an area of the Tennessee River between the Cumberland Mountains to the west and the Appalachian Mountains to the east. Local topography is complex with a number of minor valleys and ridges giving a local relief of as much as 500 feet. The Tennessee River approaches Chattanooga from the northeast and forms a loop southwest to west to northwest of the City at an elevation of about 630 feet above mean sea level. Most of the City lies on the south side of the river. On the north and southwest sides, the terrain rises abruptly to about 1,200 feet above the river. This complex topography results in marked variations in air drainage, wind, and minimum temperatures within short distances. In winter the Cumberland Mountains have a moderating influence on the local climate by retarding the flow of cold air from the north and west.

Chattanooga enjoys a moderate climate, characterized by cool winters and quite warm summers. Because of the sheltering effect of the mountains, winter temperatures average about 3° warmer than at stations on the southern Cumberland Plateau section of the State. Winter weather is changeable and alternates between cool spells, with an occasional cold period. Extreme cold is rare. Temperatures fall as low as the freezing point on a little over one-half of the winter days. Temperatures below zero have occurred only 15 times since 1879. Snowfall from year to year is greatly variable. Some winters have little or none. Heavy snowfalls have occurred, but any appreciable accumulation of snow seldom remains on the ground more than a few days. Ice storms of freezing rain or glaze are not uncommon; occasionally mid-winter icing becomes severe enough to do some damage in the area.

Summer temperatures are either in the high eighties or low nineties. Temperatures of 100° or higher are unusual, having occurred less than one-fourth of the years since the turn of the century. Most afternoon temperatures are modified by thunderstorms; temperatures frequently plunge 10° to 15° in a matter of minutes during one of these showers.

Precipitation in the Chattanooga area is well distributed throughout the year with the greater amounts in wintertime when cyclonic storms from the Gulf of Mexico reach the area with greater intensity and frequency. A second peak rainfall period generally occurs in July, principally from thundershowers that move into the area from the south and southwest. During any year there are usually a few of these storms that can be classified as severe, with hail and damaging winds. On the average, a rainfall at least as great as 1.5 inches in one hour can be expected about once every two years, 3 inches in two hours once every ten years, and 4 inches in 12 hours every five or six years.

The growing season averages 228 days. Records from 1940 to date show the average date of last freezing temperatures in spring to be April 3 and the latest, April 25. The average date of the first freezing temperature in the fall is November 9 and the earliest, October 27.

Spring and autumn are very enjoyable seasons in Chattanooga, with many days being nearly ideal in temperature. To many, the fall months of September, October, and November are the most pleasant. Rainfall is at a minimum, sunshine at a relative maximum and temperature extremes are practically non-existent.

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA AND INFORMATION SERVICE / NATIONAL CLIMATIC CENTER ASHEVILLE, N.C.

Meteorological Data For The Current Year

Station: CHATTANOOGA, TENNESSEE # 13882 LOVELL FIELD Standard time used: EASTERN Latitude: 35° 02' N Longitude: 85° 12' W Elevation (ground): 665 feet Year: 1981

Month	Temp °F Avg Daily maximum	Daily minimum	Monthly	Extremes Highest	Date	Lowest	Date	Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Total	Greatest in 24 hrs.	Date	Snow, Ice pellets Total	Greatest in 24 hrs.	Date
JAN	46.5	24.5	35.5	64	25	8	12	907	0	1.91	0.75	20-21	T	T	6
FEB	55.3	31.4	43.4	75	26	8	12	600	0	5.07	2.11	10-11	T	T	11
MAR	60.5	35.7	48.1	83	31	25	17	515	0	4.44	2.12	29-30	0.0	0.0	
APR	77.2	52.2	64.7	87	28	37	6	70	68	3.81	1.17	4-5	0.0	0.0	
MAY	76.0	53.2	64.6	90	30	42	16	81	77	3.38	1.05	18-19	0.0	0.0	
JUN	88.5	67.5	78.0	97	25	61	19	0	400	3.70	1.35	31-1	0.0	0.0	
JUL	91.6	70.9	81.4	98	14	63	31	0	513	3.99	1.57	1	0.0	0.0	
AUG	87.0	67.6	77.3	98	5	60	22	0	385	4.21	1.61	29-30	0.0	0.0	
SEP	81.3	58.1	69.7	88	13	42	19	31	178	2.74	1.09	1	0.0	0.0	
OCT	69.6	47.4	58.6	89	1	32	20	211	21	2.80	0.85	25-26	0.0	0.0	
NOV	62.5	39.1	50.8	76	4	25	22	422	2	4.85	1.60	4-5	0.0	0.0	
DEC	46.2	30.2	38.2	60	23	9	20	823	0	5.02	2.02	30-1	0.1	0.1	21
YEAR	70.2	48.2	59.2	98	AUG 5	8	FEB 12	3660	1644	45.92	2.12	MAR 29-30	0.1	0.1	DEC 21

Month	Relative humidity, pct. Hour 01	Hour 07	Hour 13	Hour 19 (Local time)	Wind Resultant Direction	Speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Direction	Date	Percent of possible sunshine	Average sky cover, tenths, sunrise to sunset	Number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperature °F Maximum (b) 90° and above	Maximum 32° and below	Minimum 32° and below	Minimum 0° and below	Average station pressure mb. Elev. 688 feet m.s.l.
JAN	68	74	49	51	34	2.8	6.3	23	34	2	69	5.3	12	6	13	5	0	0	2	0	3	26	0	995.6
FEB	71	76	52	53	25	1.7	6.4	23	22	23	66	5.9	7	12	9	4	0	2	1	0	2	15	0	996.6
MAR	69	77	43	44	33	2.4	7.2	23	14	30	75	5.8	8	11	12	10	0	1	0	0	0	12	0	990.9
APR	72	81	47	47	22	3.1	7.5	23	19	8	78	6.2	8	8	14	9	0	8	2	0	0	0	0	994.9
MAY	81	82	55	57	29	0.9	5.8	23	18	31	65	7.5	4	7	20	10	0	6	0	1	0	0	0	989.5
JUN	85	86	57	57	24	1.6	5.3	30	34	22	78	5.4	10	10	10	11	0	12	2	13	0	0	0	991.5
JUL	80	85	53	60	23	1.0	5.3	23	36	24	73	6.5	4	15	12	10	0	12	0	23	0	0	0	992.2
AUG	83	87	57	61	18	0.9	4.1	24	34	6	68	6.6	5	13	13	12	0	5	1	11	0	0	0	992.2
SEP	82	84	52	58	25	0.4	4.3	17	35	8	77	4.7	12	13	5	4	0	2	5	0	0	0	0	993.2
OCT	73	79	52	58	32	1.5	5.4	24	31	18	68	6.9	6	8	17	6	0	0	3	0	0	1	0	995.3
NOV	79	85	54	64	32	1.2	4.2	17	31	21	61	6.3	8	6	16	8	0	4	2	0	0	9	0	993.9
DEC	73	76	59	63	33	2.2	6.8	21	31	17	50	7.0	7	6	18	13	0	0	2	0	2	17	0	994.6
YEAR	76	81	53	56	29	1.0	5.7	30	34	JUN 22	70	6.2	91	115	159	109	0	52	20	48	7	80	0	993.4

Normals, Means, And Extremes

Month	Temp °F Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs.	Year
(a)				42		42					42		42		42		51		51	
J	49.9	30.5	40.2	76	1949	-10	1966	769	0	5.38	12.28	1947	1.13	1961	4.44	1949	8.4	1966	8.4	1966
F	53.4	32.3	42.9	79	1977	1	1958	625	6	5.19	11.03	1944	0.62	1941	3.93	1958	10.4	1960	8.7	1960
M	61.2	36.4	49.8	87	1963	8	1960	483	12	5.63	16.32	1980	1.17	1967	6.53	1973	10.1	1960	6.0	1960
A	72.5	48.1	60.5	93	1942	26	1973	165	30	4.42	11.92	1964	0.44	1942	3.07	1944	1.0	1971	1.0	1971
M	81.0	56.0	68.5	99	1941	34	1971	51	159	3.43	9.21	1979	0.54	1941	3.47	1979	T	1944	T	1944
J	87.5	64.5	76.0	104	1952	41	1972	0	330	3.68	9.40	1949	0.87	1968	4.85	1949	0.0		0.0	
J	89.5	68.1	78.8	106	1952	51	1972	0	428	5.14	11.75	1979	0.20	1957	5.77	1979	0.0		0.0	
A	89.0	67.0	78.0	105	1947	50	1946	0	403	3.22	7.54	1975	0.56	1963	3.79	1941	0.0		0.0	
S	83.4	[illegible]	71.9	102	1954	36	1967	9	216	3.69	14.19	1977	0.34	1941	6.62	1977	0.0		0.0	
O	73.5	45.1	60.8	94	1954	22	1952	182	52	2.95	9.91	1949	0.24	1963	3.52	1977	T	1954	T	1954
N	60.7	37.1	48.9	84	1961	4	1950	483	0	3.94	13.59	1948	0.93	1953	4.56	1948	2.6	1950	2.6	1950
D	50.9	31.4	41.2	78	1951	-2	1962	738	0	5.25	13.68	1961	0.86	1965	5.25	1942	9.1	1963	8.9	1963
YR	71.1	46.5	59.8	106	JUL 1952	-10	JAN 1966	3505	1636	51.92	16.32	MAR 1980	0.20	JUL 1957	6.67	SEP 1977	10.4	FEB 1960	8.9	DEC 1963

Month	Relative humidity pct. Hour 01	Hour 07	Hour 13	Hour 19 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max. (b) 90° and above	Max. 32° and below	Min. 32° and below	Min. 0° and below	Average station pressure mb. Elev. 688 feet m.s.l.
(a)	41	51	51	51	41	23	6	6		51	51	51	51	51	51	51	51	51	41	41	41	41	9
J	79	81	63	67	7.2	S	30	31	1978	47	6.7	7	7	17	12	1	1	3	2	2	19	*	995.5
F	77	80	57	60	7.6	S	37	25	1976	49	6.4	8	5	15	11	1	2	2	0	1	14	[illegible]	994.8
M	77	81	53	55	8.1	S	30	24	1978	51	6.3	9	8	15	12	*	4	2	[illegible]	*	9	[illegible]	992.2
A	78	81	49	51	7.6	S	32	16	1977	60	5.8	9	8	13	10	*	5	2	*	[illegible]	1	[illegible]	992.6
M	86	85	52	57	6.1	S	33	29	1977	65	5.8	9	10	12	10	0	7	2	3	[illegible]	*	[illegible]	992.4
J	88	86	55	60	5.4	S	33	34	1981	65	5.7	8	12	10	11	0	10	2	13	0	0	0	992.1
J	88	89	57	64	5.2	S	25	35	1980	61	6.0	7	13	11	12	0	11	2	16	0	0	0	992.5
A	93	91	57	66	4.7	S	37	05	1979	63	5.6	8	13	10	10	0	8	1	14	0	0	0	993.6
S	89	90	56	67	5.0	S	26	15	1979	63	5.4	10	10	10	8	0	4	4	5	0	0	0	993.9
O	88	69	53	67	5.1	S	24	31	1981	63	4.7	14	7	10	7	0	1	6	*	0	1	*	994.7
N	82	84	55	66	6.2	S	24	18	1979	53	5.6	11	6	13	9	*	1	4	0	*	10	*	995.3
D	81	83	62	69	6.6	S	28	31	1976	43	6.5	8	6	17	11	*	1	3	0	1	16	*	995.4
YR	84	85	56	62	6.2	S	37	05	AUG 1979	57	5.9	107	105	153	120	2	56	35	49	4	75	*	993.5

November 1975 to date.

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows:

Precipitation
Minimum monthly : .04 in Sep. 1919.
Maximum in 24 hours: 7.61 in Mar. 1886.

Snowfall
Maximum monthly : 15.8 in Jan. 1893.
Maximum in 24 hours: 12.0 in Dec. 1886.

Site No. TND 003327251

Reference No. 7

Uncontrolled Hazardous Waste Site Ranking System

A Users Manual
(HW-10)

Originally Published in
the July 16, 1982, *Federal Register*

United States
Environmental Protection
Agency

1984

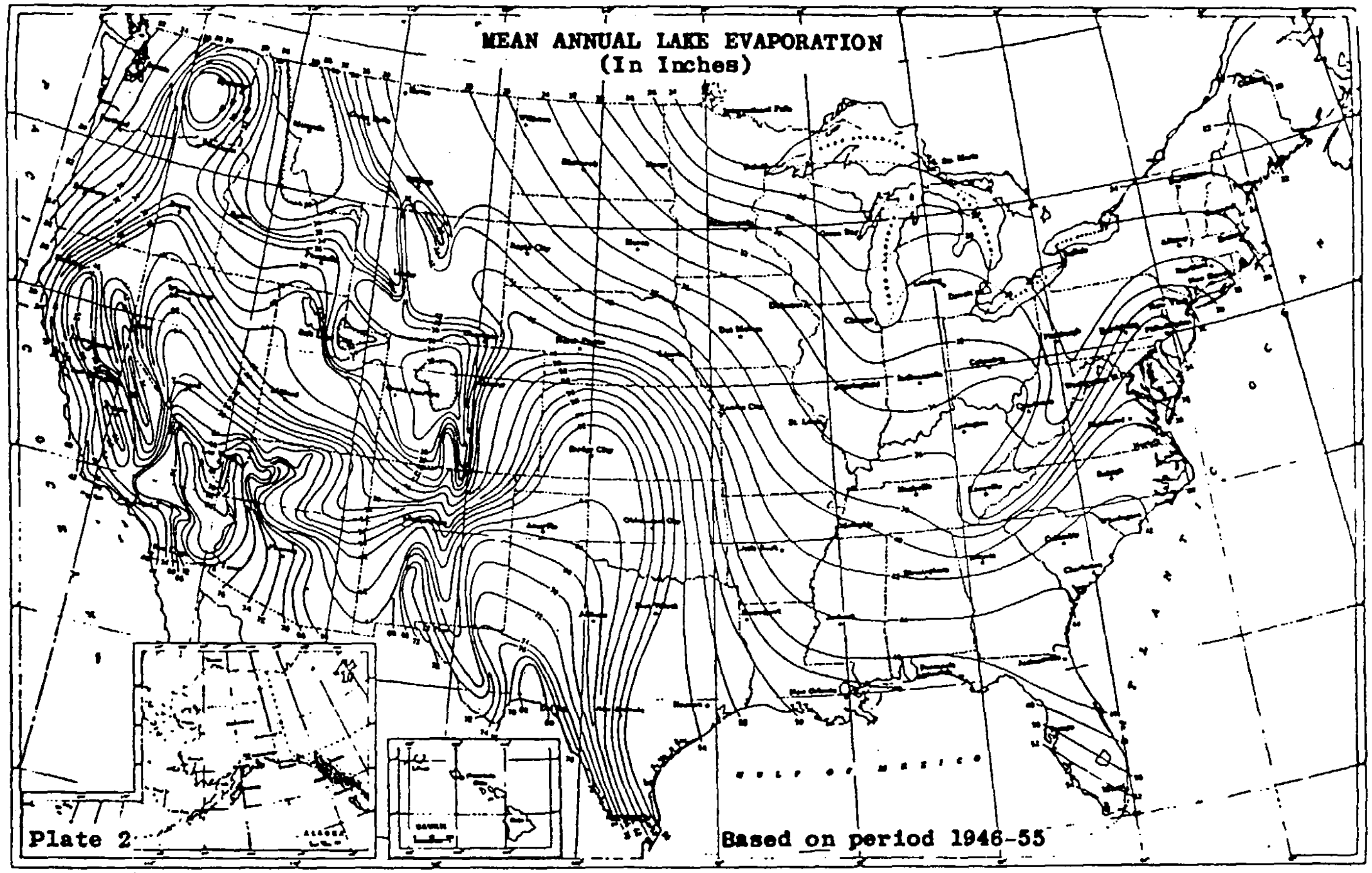
Distance	Assigned Value
>150 feet	0
76 to 150 feet	1
21 to 75 feet	2
0 to 20 feet	3

Net precipitation (precipitation minus evaporation) indicates the potential for leachate generation at the facility. Net seasonal rainfall (seasonal rainfall minus seasonal evaporation) data may be used if available. If net precipitation is not measured in the region in which the facility is located, calculate it by subtracting the mean annual lake evaporation for the region (obtained from Figure 4) from the normal annual precipitation for the region (obtained from Figure 5). EPA Regional Offices will have maps for areas outside the continental U.S. Assign a value as follows:

Net Precipitation	Assigned Value
<-10 inches	0
-10 to +5 inches	1
+5 to +15 inches	2
>+15 inches	3

Permeability of unsaturated zone (or intervening geological formations) is an indicator of the speed at which a contaminant could migrate from a facility. Assign a value from Table 2.

Physical state refers to the state of the hazardous substances at the time of disposal, except that gases generated by the hazardous substances in a disposal area should be considered in rating this factor. Each of the hazardous substances being evaluated is assigned a value as follows:



Source: Climatic Atlas of the United States, U.S. Department of Commerce, National Climatic Center, Ashville, N.C., 1979.

FIGURE 4
MEAN ANNUAL LAKE EVAPORATION
(IN INCHES)

Source: Climatic Atlas of the United States, U.S. Department of Commerce, National Climatic Center, Ashville, N.C., 1979.

FIGURE 5
NORMAL ANNUAL TOTAL PRECIPITATION (INCHES)

TABLE 2

PERMEABILITY OF GEOLOGIC MATERIALS*

Type of Material	Approximate Range of Hydraulic Conductivity	Assigned Value
Clay, compact till, shale; unfractured metamorphic and igneous rocks	$<10^{-7}$ cm/sec	0
Silt, loess, silty clays, silty loams, clay loams; less permeable limestone, dolomites, and sandstone; moderately permeable till	10^{-5} - 10^{-7} cm/sec	1
Fine sand and silty sand; sandy loams; loamy sands; moderately permeable limestone, dolomites, and sandstone (no karst); moderately fractured igneous and metamorphic rocks, some coarse till	10^{-3} - 10^{-5} cm/sec	2
Gravel, sand; highly fractured igneous and metamorphic rocks; permeable basalt and lavas; karst limestone and dolomite	$>10^{-3}$ cm/sec	3

*Derived from:

Davis, S. N., Porosity and Permeability of Natural Materials in Flow-Through Porous Media, R.J.M. DeWest ed., Academic Press, New York, 1969

Freeze, R.A. and J.A. Cherry, Groundwater, Prentice-Hall, Inc., New York, 1979

Physical State	Assigned Value
Solid, consolidated or stabilized	0
Solid, unconsolidated or unstabilized	1
Powder or fine material	2
Liquid, sludge or gas	3

3.3 Containment of deposition

Containment is a measure of the natural or artificial means that have been used to minimize or prevent a contaminant from entering ground water. Examples include liners, leachate collection systems, and sealed containers. In assigning a value to this rating factor (Table 3), consider all ways in which hazardous substances are stored or disposed at the facility. If the facility involves more than one method of storage or disposal, assign the highest from among all applicable values (e.g., if a landfill has a containment value of 1, and, at the same location, a surface impoundment has a value of 2, assign containment a value of 2).

3.4 Waste Characteristics

In determining a waste characteristics score, evaluate the most hazardous substances at the facility that could migrate (i.e., if scored, containment is not equal to zero) to ground water. Take the substance with the highest score as representative of the potential hazard due to waste characteristics. Note that the substance that may have been observed in the release category can differ from the

TABLE 3

CONTAINMENT VALUE FOR GROUND WATER ROUTE

Assign containment a value of 0 if: (1) all the hazardous substances at the facility are underlain by an essentially non permeable surface (natural or artificial) and adequate leachate collection systems and diversion systems are present; or (2) there is no ground water in the vicinity. The value "0" does not indicate no risk. Rather, it indicates a significantly lower relative risk when compared with more serious sites on a national level. Otherwise, evaluate the containment for each of the different means of storage or disposal at the facility using the following guidance.

A. Surface Impoundment

	Assigned Value
Sound run-on diversion structure, essentially non permeable liner (natural or artificial) compatible with the waste, and adequate leachate collection system	0
Essentially non permeable compatible liner with no leachate collection system; or inadequate freeboard	1
Potentially unsound run-on diversion structure; or moderately permeable compatible liner	2
Unsound run-on diversion structure; no liner; or incompatible liner	3

B. Containers

	Assigned Value
Containers sealed and in sound condition, adequate liner, and adequate leachate collection system	0
Containers sealed and in sound condition, no liner or moderately permeable liner	1
Containers leaking, moderately permeable liner	2
Containers leaking and no liner or incompatible liner	3

C. Piles

	Assigned Value
Piles uncovered and waste stabilized; or piles covered, waste unstabilized, and essentially non permeable liner	0
Piles uncovered, waste unstablized, moderately permeable liner, and leachate collection system	1
Piles uncovered, waste unstabilized, moderately permeable liner, and no leachate collection system	2
Piles uncovered, waste unstablized, and no liner	3

D. Landfill

	Assigned Value
Essentially non permeable liner, liner compatible with waste, and adequate leachate collection system	0
Essentially non permeable compatible liner, no leachate collection system, and landfill surface precludes ponding	1
Moderately permeable, compatible liner, and landfill surface precludes ponding	2
No liner or incompatible liner; moderately permeable compatible liner; landfill surface encourages ponding; no run-on control	3

substance used in rating waste characteristics. Where the total inventory of substances in a facility is known, only those present in amounts greater than the reportable quantity (see CERCLA Section 102 for definition) may be evaluated.

Toxicity and Persistence have been combined in the matrix below because of their important relationship. To determine the overall value for this combined factor, evaluate each factor individually as discussed below. Match the individual values assigned with the values in the matrix for the combined rating factor. Evaluate several of the most hazardous substances at the facility independently and enter only the highest score in the matrix on the work sheet.

	Value for Persistence			
Value for Toxicity	0	1	2	3
0	0	0	0	0
1	3	6	9	12
2	6	9	12	15
3	9	12	15	18

Persistence of each hazardous substance is evaluated on its biodegradability as follows:

Substance	Assigned Value
Easily biodegradable compounds	0
Straight chain hydrocarbons	1
Substituted and other ring compounds	2
Metals, polycyclic compounds and halogenated hydrocarbons	3

more specific information is given in Tables 4 and 5.

Toxicity of each hazardous substance being evaluated is given a value using the rating scheme of Sax (9th Edition) (Table 6) or the National Fire Protection Association (NFPA) (Table 7) and the following guidance:

Toxicity	Assigned Value
Sax level 0 or NFPA level 0	0
Sax level 1 or NFPA level 1	1
Sax level 2 or NFPA level 2	2
Sax level 3 or NFPA level 3 or 4	3

Table 4 presents values for some common compounds.

Hazardous waste quantity includes all hazardous substances at a facility (as received) except that with a containment value of 0. Do not include amounts of contaminated soil or water; in such cases, the amount of contaminating hazardous substance may be estimated.

On occasion, it may be necessary to convert data to a common unit to combine them. In such cases, 1 ton = 1 cubic yard = 4 drums and for the purposes of converting bulk storage, 1 drum = 50 gallons. Assign a value as follows:

Tons/Cubic Yards	No. of Drums	Assigned Value
0	0	0
1-10	1-40	1
11-62	41-250	2
63-125	251-500	3
126-250	501-1000	4
251-625	1001-2500	5
626-1250	2501-5000	6
1251-2500	5001-10,000	7
>2500	>10,000	8

TABLE 5

PERSISTENCE (BIODEGRADABILITY) OF SOME ORGANIC COMPOUNDS*

VALUE = 3 HIGHLY PERSISTENT COMPOUNDS	
aldrin	heptachlor
benzopyrene	heptachlor epoxide
benzothiazole	1,2,3,4,5,7,7-heptachloronorbornene
benzothiophene	hexachlorobenzene
benzyl butyl phthalate	hexachloro-1,3-butadiene
bromochlorobenzene	hexachlorocyclohexane
bromoform butanal	hexachloroethane
bromophenyl phyntl ether	methyl benzothiazole
chlordane	pentachlorobiphenyl
chlorohydroxy benzophenone	pentachlorophenol
bis-chloroisopropyl ether	1,1,3,3-tetrachloroacetone
m-chloronitrobenzene	tetrachlorobiphenyl
DDE	thiomethylbenzothiazole
DDT	trichlorobenzene
dibromobenzene	trichlorobiphenyl
dibutyl phthalate	trichlorofluoromethane
1, 4-dichlorobenzene	2,4,6-trichlorophenol
dichlorodifluoroethane	triphenyl phosphate
dieldrin	bromodichloromethane
diethyl phthalate	bromoform
di(2-ethylhexyl)phthalate	carbon tetrachloride
dihexyl phthalate	chloroform
di-isobutyl phthalate	chloromochloromethane
dimethyl phthalate	dibromodichloroethane
4,6-dinitro-2-aminophenol	tetrachloroethane
dipropyl phthalate	1,1,2-trichloroethane
endrin	

VALUE = 1 SOMEWHAT PERSISTENT COMPOUNDS	
acetylene dichloride	limonene
behenic acid, methyl ester	methyl ester of lignoceric acid
benzene	methane
benzene sulfonic acid	2-methyl-5-ethyl-pyridine
butyl benzene	methyl naphthalene
butyl bromide	methyl palmitate
e-caprolactam	methyl phenyl carbinol
carbon-disulfide	methyl stearate
o-cresol	naphthalene
decane	nonane
1,2-dichloroethane	octane
1,2-dimethoxy benzene	octyl chloride
1,3-dimethyl naphthalene	pentane
1,4-dimethyl phenol	phenyl benzoate
dioctyl adipate	phthalic anhydride
n-dodecane	propylbenzene
ethyl benzene	1-terpineol
2-ethyl-n-hexane	toluene
o-ethyltoluene	vinyl benzene
isodecane	xylene
isoprophyl benzene	

VALUE = 2 PERSISTENT COMPOUNDS	
acenaphthylene	cis-2-ethyl-4-methyl-1,3-dioxolane
atrazine	trans-2-ethyl-4-methyl-1,3-dioxolane
(diethyl) atrazine	guaiacol
barbital	2-hydroxyadiponitrile
borneol	isophorone
bromobenzene	indene
camphor	isoborneol
chlorobenzene	isopropenyl-r-isopropyl benzene
1,2-bis-chloroethoxy ethane	2-methoxy biphenyl
b-chloroethyl methyl ether	methyl biphenyl
chloromethyl ether	methyl chloride
chloromethyl ethyl ether	methylindene
3-chloropyridine	methylene chloride
di-t-butyl-p-benzoquinone	nitroanisole
dichloroethyl ether	nitrobenzene
dihyrocarvone	1,1,2-trichloroethylene
dimethyl sulfoxide	trimethyl-trioxo-hexahydro-triazine iosmer
2,6-dinitrotoluene	

VALUE = 0 NONPERSISTENT COMPOUNDS	
acetaldehyde	methyl benzoate
acetic acid	3-methyl butanol
acetone	methyl ethyl ketone
acetophenone	2-methylpropanol
benzoic acid	octadecane
di-isobutyl carbinol	pentadecane
docosane	pentanol
eicosane	propanol
ethanol	propylamine
ethylamine	tetradecane
hexadecane	n-tridecane
methanol	n-undecane

3.5 Targets

Ground water use indicates the nature of the use made of ground water drawn from the aquifer of concern within 3 miles of the hazardous substance, including the geographical extent of the measurable concentration in the aquifer. Assign a value using the following guidance:

Ground Water Use	Assigned Value
Unusable (e.g., extremely saline aquifer, extremely low yield, etc.)	0
Commercial, industrial or irrigation and another water source presently available; not used, but usable	1
Drinking water with municipal water from alternate unthreatened sources presently available (i.e., minimal hookup requirements); or commercial, industrial or irrigation with no other water source presently available	2
Drinking water; no municipal water from alternate unthreatened sources presently available	3

Distance to nearest well and population served have been combined in the matrix below to better reflect the important relationship between the distance of a population from hazardous substances and the size of the population served by ground water that might be contaminated by those substances. To determine the overall value for this combined factor, score each individually as discussed below. Match the individual values assigned with the values in the matrix for the total score.

Value for Population Served	Value for Distance to Nearest Well 0	1	2	3	4
0	0	0	0	0	0
1	0	4	6	8	10
2	0	8	12	16	20
3	0	12	18	24	30
4	0	16	24	32	35
5	0	20	30	35	40

Distance to nearest well is measured from the hazardous substance (not the facility boundary) to the nearest well that draws water from the aquifer of concern. If the actual distance to the nearest well is unknown, use the distance between the hazardous substance and the nearest occupied building not served by a public water supply (e.g., a farmhouse). If a discontinuity in the aquifer occurs between the hazardous substance and all wells, give this factor a score of 0, except where it can be shown that the contaminant is likely to migrate beyond the discontinuity. Figure 6 illustrates how the distance should be measured. Assign a value using the following guidance:

Distance	Assigned Value
>3 miles	0
2 to 3 miles	1
1 to 2 miles	2
2001 feet to 1 mile	3
< 2000 feet	4

How many people drinking from Aquifer 3 mile Radius

Population served by ground water is an indicator of the population at risk, which includes residents as well as others who would regularly use the water such as workers in factories or offices and students. Include employees in restaurants, motels, or campgrounds but exclude customers and travelers passing through the area in autos, buses, or trains. If aerial photography is used, and residents are known to use ground water, assume each dwelling unit has 3.8 residents. Where ground water is used for irrigation, convert to population by assuming 1.5 persons per acre of irrigated land. The well or wells of concern must be within three miles of the hazardous substances, including the area of known aquifer contamination, but the "population served" need not be. Likewise, people within three miles who do not use water from the aquifer of concern are not to be counted. Assign a value as follows:

Population	Assigned Value
0	0
1-100	1
101-1,000	2
1,001-3,000	3
3,001-10,000	4
>10,000	5

TABLE 8

VALUES FOR FACILITY SLOPE AND INTERVENING TERRAIN

Facility Slope		Intervening Terrain				
		Terrain Average Slope ≤3%; or Site Separated from Water Body by Areas of Higher Elevation	Terrain Average Slope 3–5%	Terrain Average Slope 5–8%	Terrain Average Slope >8%	Site in Surface Water
Facility is closed basin		0	0	0	0	3
Facility has average slope	≤3%	0	1	1	2	3
Average slope	3–5%	0	1	2	2	3
Average slope	5–8%	0	2	2	3	3
Average slope	>8%	0	2	3	3	3

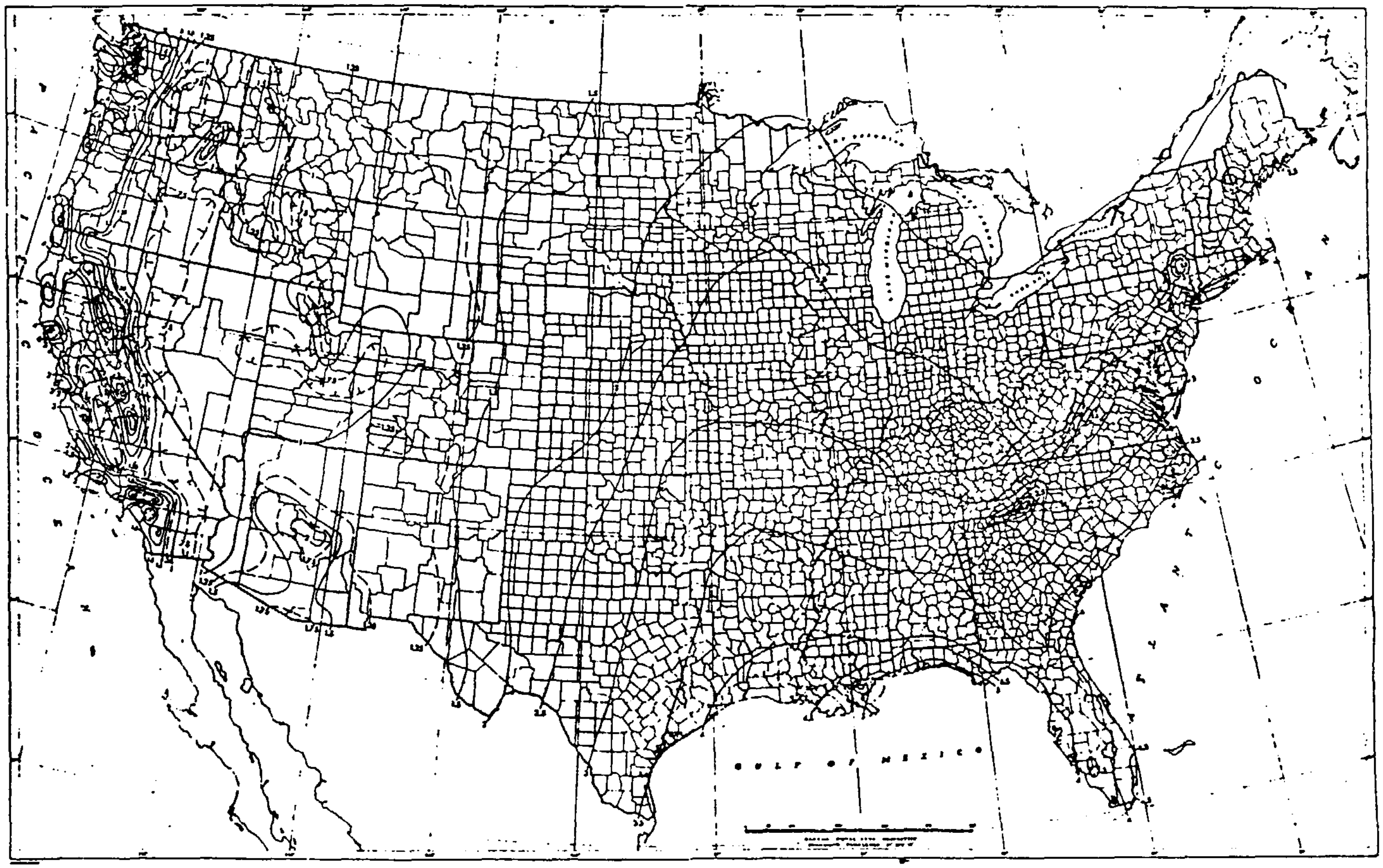
One-year 24-hour rainfall (obtained from Figure 8) indicates the potential for area storms to cause surface water contamination as a result of runoff, erosion, or flow over dikes. Assign a value as follows:

Amount of Rainfall (inches)	Assigned Value
<1.0	0
1.0-2.0	1
2.1-3.0	2
>3.0	3

Distance to the nearest surface water is the shortest distance from the hazardous substance, (not the facility or property boundary) to the nearest downhill body of surface water (e.g., lake or stream) that is on the course that runoff can be expected to follow and that at least occasionally contains water. Do not include man-made ditches which do not connect with other surface water bodies. In areas having less than 20 inches of normal annual precipitation (see Figure 5), consider intermittent streams. This factor indicates the potential for pollutants flowing overland and into surface water bodies. Assign a value as follows:

Distance	Assigned Value
>2 miles	0
1 to 2 miles	1
1000 feet to 1 mile	2
<1000 feet	3

Physical state is assigned a value using the procedures in Section 3.2.



Source: Rainfall Frequency Atlas of the United States, Technical Paper No. 40, U.S. Department of Commerce, U.S. Government Printing Office, Washington, D.C., 1963.

FIGURE 8
1-YEAR 24-HOUR RAINFALL
(INCHES)

4.3 Containment

Containment is a measure of the means that have been taken to minimize the likelihood of a contaminant entering surface water either at the facility or beyond the facility boundary. Examples of containment are diversion structures and the use of sealed containers. If more than one type of containment is used at a facility, evaluate each separately (Table 9) and assign the highest score.

4.4 Waste Characteristics

Evaluate waste characteristics for the surface water route with the procedures described in Section 3.4 for the ground water route.

4.5 Targets

Surface water use brings into the rating process the use being made of surface water downstream from the facility. The use or uses of interest are those associated with water taken from surface waters within a distance of three miles from the location of the hazardous substance. Assign a value as follows:

Surface Water Use (Fresh or Salt Water)	Assigned Value
Not currently used	0
Commercial or industrial	1
Irrigation, economically important resources (e.g., shellfish), commercial food preparation, or recreation (e.g., fishing, boating, swimming)	2
Drinking Water	3

TABLE 9

CONTAINMENT VALUES FOR SURFACE WATER ROUTE

Assign containment a value of 0 if: (1) all the waste at the site is surrounded by diversion structures that are in sound condition and adequate to contain all runoff, spills, or leaks from the waste; or (2) intervening terrain precludes runoff from entering surface water. Otherwise, evaluate the containment for each of the different means of storage or disposal at the site and assign a value as follows:

A. Surface Impoundment

	Assigned Value
Sound diking or diversion structure, adequate freeboard, and no erosion evident	0
Sound diking or diversion structure, but inadequate freeboard	1
Diking not leaking, but potentially unsound	2
Diking unsound, leaking, or in danger of collapse	3

B. Containers

	Assigned Value
Containers sealed, in sound condition, and surrounded by sound diversion or containment system	0
Containers sealed and in sound condition, but not surrounded by sound diversion or containment system	1
Containers leaking and diversion or containment structures potentially unsound	2
Containers leaking, and no diversion or containment structures or diversion structures leaking or in danger of collapse	3

C. Waste Piles

	Assigned Value
Piles are covered and surrounded by sound diversion or containment system	0
Piles covered, wastes unconsolidated, diversion or containment system not adequate	1
Piles not covered, wastes unconsolidated, and diversion or containment system potentially unsound	2
Piles not covered, wastes unconsolidated, and no diversion or containment or diversion system leaking or in danger or collapse	3

D. Landfill

	Assigned Value
Landfill slope precludes runoff, landfill surrounded by sound diversion system, or landfill has adequate cover material	0
Landfill not adequately covered and diversion system sound	1
Landfill not covered and diversion system potentially unsound	2
Landfill not covered and no diversion system present, or diversion system unsound	3

TABLE 10

VALUES FOR SENSITIVE ENVIRONMENT (SURFACE WATER)

ASSIGNED VALUE =	0	1	2	3
DISTANCE TO WETLANDS* (5 acre minimum)				
Coastal	>2 miles	1 - 2 miles	½ - 1 mile	< ½ mile
Fresh Water	>1 mile	¼ - 1 mile	100 feet - ¼ mile	< 100 feet
DISTANCE TO CRITICAL HABITAT (of endangered species)**	>1 mile	½ - 1 mile	¼ - ½ mile	< ¼ mile

*Wetland is defined by EPA in the Code of Federal Regulations 40 CFR Part 230, Appendix A, 1980

**Endangered species are designated by the U.S. Fish and Wildlife Service.

Distance to Surface Water

Population	>3 miles	2-3 miles	1-2 miles	2001 feet to 1 mile	0-2000 feet
0	0	0	0	0	0
1-100	0	4	6	8	10
101-1000	0	8	12	16	20
1001-3000	0	12	18	24	30
3001-10,000	0	16	24	32	35
>10,000	0	20	30	35	40

8.0 DIRECT CONTACT

The direct contact hazard mode refers to the potential for injury by direct contact with hazardous substances at the facility.

8.1 Observed Incident

If there is a confirmed instance in which contact with hazardous substances at a facility has caused injury, illness, or death to humans or domestic or wild animals, enter a value of 45 on line 1 of the work sheet (Figure 12) and proceed to line 4 (toxicity). Document the incident giving the date, location and pertinent details. If no such instance is known, enter "0" on line 1 and proceed to line 2.

8.2 Accessibility

Accessibility to hazardous substance refers to the measures taken to limit access by humans or animals to hazardous substances. Assign a value using the following guidance:

Barrier	Assigned Value
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility; or an artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0

Barrier (continued)	Assigned Value
Security guard, but no barrier	1
A barrier, but no separate means to control entry	2
Barriers do not completely surround the facility	3

8.3 Containment

Containment indicates whether the hazardous substance itself is accessible to direct contact. For example, if the hazardous substance at the facility is in surface impoundments, containers (sealed or unsealed), piles, tanks, or landfills with a cover depth of less than 2 feet, or has been spilled on the ground or other surfaces easily contacted (e.g., the bottom of shallow pond or creek), assign this rating factor a value of 15. Otherwise, assign a value of 0.

8.4 Waste Characteristics

Toxicity. Assign a value as in Section 3.4.

8.5 Targets

Population within one-mile radius is a rough indicator of the population that could be involved in direct contact incidents at an uncontrolled facility. Assign a value as follows:

Population	Assigned Value
0	0
1 - 100	1
101 - 1,000	2
1,001 - 3,000	3
3,001 - 10,000	4
>10,000	5

Site No. TND 003327251

Reference No. 8

soil survey of

Hamilton County, Tennessee

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Tennessee Agricultural Experiment Station

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing and local commercial districts.

This soil is moderately suited to agricultural use. The very slowly permeable clay subsoil retards root growth and the movement of water and air through the soil. Row crops such as corn and soybeans grow poorly on this soil. Pasture plants, such as common bermudagrass, tall fescue, and serecia lespedeza, grow fairly well.

This soil is moderately suited to use as woodland because of moderate available water capacity and the very slowly permeable clay subsoil. Trees that grow on this soil include loblolly pine and shortleaf pine. The clayey subsoil near the surface causes seedling mortality and limits the use of equipment when the soil is wet.

This soil is poorly suited to most urban uses. The very slow permeability, low strength, and high shrink-swell potential are limitations which are difficult to overcome. Engineering works and highway and street construction are limited by the low strength, high shrink-swell potential, and depth to bedrock of this soil.

This soil is in capability subclass IVe and woodland subclass 4c.

CcD—Colbert-Rock outcrop complex, 5 to 20 percent slopes. This map unit consists of small areas of sloping and moderately steep Colbert soils and limestone Rock outcrop so intermingled that they could not be separated at the scale selected for mapping. Areas of this map unit range from about 3 to 25 acres in size, and individual areas of each component range from 0.1 acre to about 2 acres. Areas of Colbert soils make up from 35 to 70 percent of the map unit and average about 45 percent. Areas of Rock outcrop make up from 30 to 55 percent of the map unit and average about 40 percent.

Colbert soils are deep and moderately well drained. Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil is yellowish brown plastic clay that extends to a depth of 45 inches. It is mottled in shades of brown and gray except in the upper 10 to 15 inches. The underlying material is olive clay which has gray and brown mottles. Limestone bedrock is at a depth of 55 inches.

Colbert soils are low in natural fertility and organic matter content. They range from slightly acid to strongly acid, except in the layers just above bedrock, which range from slightly acid to mildly alkaline. Permeability is very slow, retarding root growth and the movement of water and air through the soil. The available water capacity is only moderate because of the high clay content in the subsoil. The shrink-swell potential is high.

Rock outcrop is limestone bedrock that is exposed on the land surface. In places, the rocks are level with the 'rface, and in other places, the rocks extend 2 to 3 feet oove the surface.

Included with this unit in mapping are numerous small areas of a soil which is less than 40 inches deep to bedrock. Also included are a few areas of a soil that is less clayey in the upper part of the subsoil. Included soils make up 10 to 15 percent of the unit.

The soils are used mostly as woodland; in a few areas they are used for unimproved pasture.

These soils are poorly suited to farming, woodland, and most engineering uses. The large number of Rock outcrops is the most limiting feature. Other limiting features are very slow permeability, and the high shrink-swell potential. Some tree species that grow on these soils are hickory, chestnut oak, and eastern redcedar.

This complex is in capability subclass VIIs. The Colbert soils are in woodland subclass 4c.

CdC—Colbert-Urban land complex, 2 to 12 percent slopes. This map unit consists of deep, moderately well drained, gently sloping and sloping Colbert soils, Urban land, and disturbed areas that have been altered during construction. The areas of soils and Urban land are so intricately mixed or so small that they could not be separated at the scale selected for mapping. Areas of this map unit range from about 5 to 150 acres in size, and individual areas of each component range from 0.1 acre to about 5 acres. Colbert soils make up 25 to 45 percent of each mapped area, Urban land 25 to 45 percent, and disturbed areas 10 to 25 percent.

Typically, Colbert soils have a surface layer of brown silt loam 4 inches thick. The subsoil is yellowish brown clay that extends to a depth of 45 inches. It is mottled in shades of brown and gray, except in the upper 10 to 15 inches. The underlying material is olive clay and has gray and brown mottles. Limestone bedrock is at 55 inches.

Colbert soils are low in natural fertility and organic matter content. They are slightly acid to strongly acid, except in the layers just above bedrock, which range to mildly alkaline. Permeability is very slow, and the available water capacity is moderate. The shrink-swell potential is high.

The Urban land part of this unit is covered by buildings, streets, parking lots, sidewalks, and other structures.

The disturbed areas have been excavated during the installation of utilities, and cut and filled during grading and shaping operations. They have been altered to the extent that individual soils cannot be identified and predictions cannot be made about their suitability for use without an onsite investigation.

Included in mapping are small areas of a soil that is less clayey in the upper part of the subsoil and areas of a somewhat poorly drained soil that has gray mottles within 10 inches of the surface layer. The somewhat poorly drained soil is on level areas and slight depressions. Also included are some areas of a Talbott soil that has limestone bedrock within 40 inches of the surface.

The Colbert soils are used for parks, open space, building sites, lawns, and gardens. They are moderately to poorly suited to lawns, gardens, trees, and shrubs; and they are poorly suited to intensive recreation developments such as football fields, baseball fields, and playgrounds. Colbert soils are poorly suited to building sites, roads, and most other engineering uses. A very slowly permeable clayey subsoil, low strength when wet, and high shrink-swell potential are the major limiting features of these soils.

The Colbert soils are in woodland subclass 4c. They are not assigned to a capability subclass.

CoC—Collegedale silt loam, 2 to 12 percent slopes. This deep, well drained, gently sloping and sloping soil is on upland areas in the valleys underlain by limestone. It formed in residuum of limestone or limestone interbedded with shale. Slopes are commonly short and irregular. They range from 2 to 12 percent but are dominantly 4 to 12 percent. Individual areas range from 2 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 80 inches or more. It is yellowish red clay and has mottles in shades of brown and yellow.

The soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity is moderate to high.

Included with this soil in mapping are small areas of a soil which has a silty clay loam surface layer and a brown clayey subsoil. Also included are small areas of severely eroded soils that have a clay surface layer.

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing.

This soil is only moderately suited to use as woodland because of low fertility and the plastic clayey subsoil, which retards root growth. It has no significant limitations to woodland management. Trees that grow on this soil include loblolly pine and Virginia pine.

This soil is poorly suited to cultivated crops and moderately suited to hay and pasture. Slope and the plastic clayey subsoil are the major limitations. The clayey subsoil retards root growth and the movement of air and water through the soil. Erosion is a hazard if cultivated crops are grown.

This soil is poorly suited to most urban uses because it has moderately slow permeability and low strength when wet.

This soil is in capability subclass IVe and woodland subclass 3o.

CoD—Collegedale silt loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil is on uplands in the valleys underlain by limestone. It formed in residuum of limestone or limestone interbedded with shale. Slopes are commonly smooth and short. Individual areas range from 2 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 80 inches or more. It is yellowish red clay and has mottles in shades of brown and yellow.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity ranges from moderate to high.

Included with this soil in mapping are soils which have a silty clay loam surface layer and a brown subsoil. Also included are small areas of a soil that has more than 10 percent fragments of chert in the surface layer.

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing.

This soil is only moderately suited to use as woodland because of low natural fertility and the plastic clayey subsoil, which retards root growth. It has no significant limitations to woodland management.

This soil is poorly suited to cultivated crops and moderately suited to hay and pasture. Slope and the plastic clayey subsoil are the major limitations. The clayey subsoil retards root growth and the movement of water and air through the soil. Erosion is a hazard if cultivated crops are grown.

This soil is poorly suited to most urban uses because it has moderately slow permeability and low strength when wet.

This soil is in capability subclass VIe and woodland subclass 3o.

CrB—Crossville loam, 2 to 5 percent slopes. This moderately deep, well drained, gently sloping soil is on broad plateaus of the Cumberland Mountains. It formed in materials weathered from acid sandstone. The slopes are smooth and convex. Individual areas range from 2 to 25 acres.

Typically, the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil extends to a depth of 28 inches. It is brown and dark yellowish brown loam. The underlying material is yellowish brown loamy sand that is underlain by sandstone bedrock at 32 inches.

This soil is strongly acid throughout, except in areas where the surface layer has been limed. Natural fertility is low, and organic matter content is medium. Permeability is moderate, and the available water capacity is moderate. Tilth is good, and the root zone is moderately deep.

Included with this soil in mapping are small areas of a soil that has a higher clay content in the subsoil. Also included are some areas of Ramsey soil and a few areas of Rock outcrops.

This soil is used mostly for woodland and pasture, but some cultivated crops are grown.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
CdC*:										
Colbert----------	0-4	10-40	1.35-1.50	0.2-2.0	0.16-0.24	5.1-5.5	Moderate-----	0.43	2	.5-2
	4-55	60-75	1.35-1.50	<0.06	0.12-0.18	5.1-5.5	High---------	0.32		
	55	---	---	---	---	---	-------------	----		
Urban land.										
CoC, CoD--------- Collegedale	0-6	10-35	1.30-1.50	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.37	5	.5-2
	6-80	40-60	1.50-1.70	0.06-0.6	0.12-0.17	4.5-5.5	Moderate-----	0.24		
CrB-------------- Crossville	0-10	10-20	1.25-1.45	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.20	2	2-4
	10-28	15-32	1.30-1.50	0.6-2.0	0.12-0.17	4.5-5.5	Low----------	0.20		
	28-32	5-15	1.30-1.50	6.0-20	0.04-0.10	4.5-5.5	Low----------	0.20		
DeB, DeD--------- Dewey	0-4	17-27	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Low----------	0.32	5	1-3
	4-60	45-60	1.50-1.60	0.6-2.0	0.12-0.17	4.5-5.5	Moderate-----	0.24		
Du--------------- Dunning	0-19	27-40	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Moderate-----	0.28	5	2-6
	19-60	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate-----	0.28		
Ec--------------- Emory	0-36	20-35	1.20-1.40	0.6-2.0	0.17-0.21	5.1-6.0	Low----------	0.37	5	1-4
	36-60	20-35	1.25-1.45	0.6-2.0	0.17-0.21	5.1-6.0	Low----------	0.37		
EdC-------------- Enders	0-10	10-25	1.25-1.60	0.6-2.0	0.10-0.20	3.6-5.5	Low----------	0.37	3	.5-2
	10-47	35-60	1.15-1.45	<0.06	0.12-0.18	3.6-5.5	High---------	0.37		
	47-60	---	---	---	---	---	-------------	----		
EeD-------------- Enders	0-5	10-25	1.25-1.60	0.6-2.0	0.10-0.20	3.6-5.5	Low----------	0.37	3	.5-2
	5-41	35-60	1.15-1.45	<0.06	0.12-0.18	3.6-5.5	High---------	0.37		
	41-60	---	---	---	---	---	-------------	----		
EgC-------------- Enders	0-12	10-25	1.25-1.60	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.32	3	.5-2
	12-55	35-60	1.15-1.45	<0.06	0.12-0.18	3.6-5.5	High---------	0.37		
	55-65	---	---	---	---	---	-------------	----		
EhC*:										
Enders-----------	0-10	10-25	1.25-1.60	0.6-2.0	0.10-0.20	3.6-5.5	Low----------	0.37	3	.5-2
	10-47	35-60	1.15-1.45	<0.06	0.12-0.18	3.6-5.5	High---------	0.37		
	47-60	---	---	---	---	---	-------------	----		
Urban land.										
En--------------- Ennis	0-6	12-25	1.30-1.45	2.0-6.0	0.10-0.15	4.5-6.0	Low----------	0.28	5	1-3
	6-60	18-32	1.35-1.50	2.0-6.0	0.08-0.15	4.5-6.0	Low----------	0.28		
EtB, EtD--------- Etowah	0-13	15-27	1.30-1.45	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.37	5	1-3
	13-40	23-35	1.35-1.50	0.6-2.0	0.16-0.20	4.5-5.5	Low----------	0.32		
	40-62	32-45	1.40-1.55	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.32		
FuB, FuD, FuE---- Fullerton	0-10	15-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.28	5	.5-2
	10-14	23-35	1.45-1.55	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.24		
	14-65	40-70	1.45-1.65	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
FwD*:										
Fullerton--------	0-10	15-27	1.45-1.55	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.28	5	.5-2
	10-14	23-35	1.45-1.55	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.24		
	14-65	40-70	1.45-1.65	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
Urban land.										
GpD, GpE--------- Gilpin	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-2
	8-24	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24		
	24-30	15-35	1.20-1.50	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24		
	30-40	---	---	---	---	---	-------------	----		
Gu--------------- Guthrie	0-6	10-25	1.35-1.55	0.6-2.0	0.20-0.22	3.6-5.0	Low----------	0.43	3	1-3
	6-30	18-30	1.40-1.60	0.6-2.0	0.18-0.20	3.6-5.0	Low----------	0.43		
	30-60	18-32	1.60-1.75	0.06-0.2	0.03-0.05	3.6-5.0	Low----------	0.43		

See footnote at end of table.

Site No. TND 003327251

Reference No. 9

Federal Superfund

FEDERAL SUPE FUND
343.38-11

REPORT OF SEDIMENT ANALYSES

Division of Water Quality Control NOV 14 1985 Tennessee Department of Public Health

~~NOV 13 1985~~

SOURCE: D.M. Steward Mile

IDENTIFICATION: Background grab soil, collected in yard 150' east of office bldg.

Field Number 1 Collected By WFH Primary Station Number Date Collected 10/1/85

Time Collected 1135 EST Sample Depth (ft.) 0.75 Laboratory Number Swm 765B

All Results Reported on Dry Weight Basis

LEGAL

	Conc.	STORET No.	
Aluminum as Al Mg/Kg		01108	
Arsenic as As Mg/Kg		01003	
Barium as Ba Mg/Kg		01008	
Boron as B Mg/Kg		01023	
Cadmium as Cd Mg/Kg ✓	<1	01028	
Chromium-total as Cr Mg/Kg ✓	17	01029	
Cobalt as Co Mg/Kg		01038	
Copper as Cu Mg/Kg ✓	170	01043	
Iron as Fe Mg/Kg		01170	
Lead as Pb Mg/Kg ✓	450	01052	
Manganese as Mn Mg/Kg ✓	5415	01053	
Mercury-total as Hg Mg/Kg ✓	<0.1	71921	
Nickel as Ni Mg/Kg ✓	17	01068	
Selenium as Se Mg/Kg ✓	<.1	01148	
Silver as Ag Mg/Kg ✓	<1	01078	
Zinc as Zn Mg/Kg ✓	73	01093	
5-day B.O.D. 20° C Mg/Kg			
C.O.D. Mg/Kg			
Oxygen uptake Mg/Kg			
Chlorine Demand, 30 min. Mg/Kg			
Cyanide as CN Mg/Kg			
Nitrates as N Mg/Kg			
Ammonia as N Mg/Kg			
Kjeldahl Nitrogen as N Mg/Kg			
Phosphate as P Mg/Kg			
Phenols Mg/Kg			
Oil and Grease Mg/Kg			
Sulfide as S Mg/Kg			
Solids, per cent			
Volatile Solids, per cent			
Silica as SiO_2 Mg/Kg			

REMARKS Total metals, ~~Organics (total)~~ RWY

PH-0548
WQC 12/79

11

Tennessee Department of Health & Environment
Bureau of Laboratory Services
Environmental Laboratories

(Lab No. Swm 765B

SAMPLE IDENTIFICATION TAG

1. Source of Sample and COMPLETE Sample Identification D. M. Steward, E. 36th St / Jerome Ave, Chattanooga - grab background soil collected from yard 150' E of D. M. Steward main office
2. County Hamilton Nearest Town or City Chattanooga
3. Type of Sample Grab soil (background)
4. Date Collected 10/17/85 Time Collected 1135 EST
5. Name of Sampler (Please Print) Walker Howell, Jan Eldridge
6. Names of Others Present at Time Sample Collected Gordon Carothers, Dave Holt, Riley Castleberry
7. Field No. 11 Approx. Vol. of Sample
8. Number of other samples collected at same time at this point 1
9. Describe field collection procedure and special handling or preservation of this sample Hole dug to depth of 8 inches w/shovel, soil collected with stainless steel spoon, placed in container
10. Describe how sample conveyed or transported to laboratory Sample transported to Nashville State Lab in State vehicle
11. Sample sealed by JEE Date sample sealed 10/17/85
12. Requested Analyses Total metals

PH-2493

13. Custody of Sample (Please Sign)

(a) Collected by	Walker F. Howell	(date)	10/17/85	(time)	1135 EST
delivered to		(date)		(time)	
(b) Received by		(date)		(time)	
delivered to		(date)		(time)	
(c) Received by		(date)		(time)	
delivered to		(date)		(time)	
(d) Received by		(date)		(time)	
delivered to		(date)		(time)	
(e) Received in laboratory by	RNY	(date)	10-18-85	(time)	1500
from	WFH	(date)	10-18-85	(time)	1500
(f) Logged in by	RPY	(date)	10-18-85	(time)	1500

14. Field Analyses and Results at Sampling Point Described in Item 1:

Analysis	Result	Date	Time	Analyst

15. Remarks

FEDERAL SUPERFUND

343.38-11

343.38 11

REPORT OF SEDIMENT ANALYSES

Division of Water Quality Control NOV 14 1985 Tennessee Department of Public Health

SOURCE: Hamilton Concrete Products Mile

IDENTIFICATION: Grab soil, from swampy area 10' SE of fill area

Field Number 2 Collected By WFH Primary Station Number Date Collected 10/17/

Time Collected 12-05 EST Sample Depth (ft.) 0.75 Laboratory Number SWM 760B

All Results Reported on Dry Weight Basis

LEGAL

	Conc.	STORET No.	
Aluminum as Al Mg/Kg		01108	
Arsenic as As Mg/Kg		01003	
Barium as Ba Mg/Kg ✓	9000	01008	
Boron as B Mg/Kg		01023	
Cadmium as Cd Mg/Kg		01028	
Chromium-total as Cr Mg/Kg ✓	60	01029	
Cobalt as Co Mg/Kg		01038	
Copper as Cu Mg/Kg ✓	31060	01043	
Iron as Fe Mg/Kg		01170	
Lead as Pb Mg/Kg ✓	12300	01052	
Manganese as Mn Mg/Kg ✓	2690	01053	
Mercury-total as Hg Mg/Kg ✓	<0.1	71921	
Nickel as Ni Mg/Kg ✓	860	01068	
Selenium as Se Mg/Kg ✓	2.6	01148	
Silver as Ag Mg/Kg ✓	<1	01078	
Zinc as Zn Mg/Kg ✓	22000	01093	
5-day B.O.D. 20° C Mg/Kg			
C.O.D. Mg/Kg			
Oxygen uptake Mg/Kg			
Chlorine Demand, 30 min. Mg/Kg			
Cyanide as CN Mg/Kg			
Nitrates as N Mg/Kg			
Ammonia as N Mg/Kg			
Kjeldahl Nitrogen as N Mg/Kg			
Phosphate as P Mg/Kg			
Phenols Mg/Kg			
Oil and Grease Mg/Kg			
Sulfide as S Mg/Kg			
Solids, per cent			
Volatile Solids, per cent			
Silica as SiO_2 Mg/Kg			

REMARKS Total metals, ~~total organics~~ RNY

PH-0548
WQC 12/79

Tennessee Department of Health & Environment
Bureau of Laboratory Services
Environmental Laboratories

(Lab No. SWM 766B)

SAMPLE IDENTIFICATION TAG

1. Source of Sample and COMPLETE Sample Identification Hamilton Concrete Products property grab soil from fill area (10 ft SE of fill area adjacent to parking lot).
2. County Hamilton Nearest Town or City Chattanooga
3. Type of Sample Grab soil
4. Date Collected 10/17/85 Time Collected 12:05 EST
5. Name of Sampler (Please Print) Walker Howell, Jan Eldridge
6. Names of Others Present at Time Sample Collected Dave Holt, Riley Castleberry, Gordon Carothers
7. Field No. 2 Approx. Vol. of Sample 1 pint
8. Number of other samples collected at same time at this point 2
9. Describe field collection procedure and special handling or preservation of this sample Hole dug to depth of 8-10 inches, sample collected using stainless steel spoon, placed in cottage cheese containers
10. Describe how sample conveyed or transported to laboratory Sample transported by State vehicle to State Lab in Nashville, Tn.
11. Sample sealed by JEE Date sample sealed 10/17/85
12. Requested Analyses
    Total metals

13. Custody of Sample - (Please Sign)

(a) Collected by Walter F. Howell (date) 10/17/85 (time) 1205 EST

delivered to ______ (date) ______ (time) ______

(b) Received by ______ (date) ______ (time) ______

delivered to ______ (date) ______ (time) ______

(c) Received by ______ (date) ______ (time) ______

delivered to ______ (date) ______ (time) ______

(d) Received by ______ (date) ______ (time) ______

delivered to ______ (date) ______ (time) ______

(e) Received in laboratory by ~~WF~~ RNY (date) 10-18-85 (time) 1500

from WFH (date) 10-18-85 (time) 1500

(f) Logged in by RNY (date) 10-18-85 (time) 1500

14. Field Analyses and Results at Sampling Point Described in Item 1:

Analysis	Result	Date	Time	Analyst

15. Remarks

FEDERAL SUPERFUND
343.38-11

Federal Superfund — FEDERAL SUPERFUND

REPORT OF SEDIMENT ANALYSES 343.38-11

Division of Water Quality Control NOV 14 1985 Tennessee Department of Public Health

SOURCE: Hamilton Concrete Products Mile

IDENTIFICATION: Grab soil, depth composited, 50' NE of fill area within previous settling basin (in swampy area)

Field Number 3 Collected By WFH Primary Station Number Date Collected 10/17/8

Time Collected 1228 EST Sample Depth (ft.) 1.5 Laboratory Number Sam 767B

All Results Reported on Dry Weight Basis

LEGAL

	Conc.	STORET No.	
Aluminum as Al Mg/Kg		01108	
Arsenic as As Mg/Kg	.2	01003	
Barium as Ba Mg/Kg	4000	01008	
Boron as B Mg/Kg		01023	
Cadmium as Cd Mg/Kg		01028	
Chromium-total as Cr Mg/Kg	66	01029	
Cobalt as Co Mg/Kg		01038	
Copper as Cu Mg/Kg	115960	01043	
Iron as Fe Mg/Kg		01170	
Lead as Pb Mg/Kg	49590	01052	
Manganese as Mn Mg/Kg	945	01053	
Mercury-total as Hg Mg/Kg	<0.1	71921	
Nickel as Ni Mg/Kg	12200	01068	
Selenium as Se Mg/Kg	1.4	01148	
Silver as Ag Mg/Kg	1	01078	
Zinc as Zn Mg/Kg	54000	01093	
5-day B.O.D. 20° C Mg/Kg			
C.O.D. Mg/Kg			
Oxygen uptake Mg/Kg			
Chlorine Demand, 30 min. Mg/Kg			
Cyanide as CN Mg/Kg			
Nitrates as N Mg/Kg			
Ammonia as N Mg/Kg			
Kjeldahl Nitrogen as N Mg/Kg			
Phosphate as P Mg/Kg			
Phenols Mg/Kg			
Oil and Grease Mg/Kg			
Sulfide as S Mg/Kg			
Solids, per cent			
Volatile Solids, per cent			
Silica as SiO_2 Mg/Kg			

REMARKS Total metals / ~~total organics~~ RNY

PH-0548
WQC 12/79

Tennessee Department of Health & Environment
Bureau of Laboratory Services
Environmental Laboratories

(Lab No. SWA 762B

SAMPLE IDENTIFICATION TAG

1. Source of Sample and COMPLETE Sample Identification D.M. Steward, E. 36th St Chattanooga; grab soil (depth composited)
2. County Hamilton Nearest Town or City Chattanooga
3. Type of Sample grab soil
4. Date Collected 10/17/85 Time Collected 1228 EST
5. Name of Sampler (Please Print) Walker Howell, Jan Eldridge
6. Names of Others Present at Time Sample Collected Gordon Carothers, David Holt, Riley Castleberry
7. Field No. 3 Approx. Vol. of Sample 500 ml
8. Number of other samples collected at same time at this point 3
9. Describe field collection procedure and special handling or preservation of this sample Hole dug w/shovel to 18" depth, soil collected from surface to bottom of hole, composited mixed in aluminum pan, then placed in cottage cheese container, placed in ice chest
10. Describe how sample conveyed or transported to laboratory Transported in state vehicle to State Lab in Nashville, Tn.
11. Sample sealed by JEE Date sample sealed 10/17/85
12. Requested Analyses Total Metals

PH-2493

13. Custody of Sample (Please Sign) Walker N. Howell (date) 10/17/85 (time) 1228 EST

(a) Collected by ______ (date) ______ (time) ______

delivered to ______ (date) ______ (time) ______

(b) Received by ______ (date) ______ (time) ______

delivered to ______ (date) ______ (time) ______

(c) Received by ______ (date) ______ (time) ______

delivered to ______ (date) ______ (time) ______

(d) Received by ______ (date) ______ (time) ______

delivered to ______ (date) 10-18-85 (time) 1500

(e) Received in laboratory by RNY (date) 10-18-85 (time) 1500

from WFH (date) 10-18-85 (time) 1500

(f) Logged in by RNY

14. Field Analyses and Results at Sampling Point Described in Item 1:

Analysis	Result	Date	Time	Analyst

15. Remarks

FEDERAL SUPERFUND
343.38-11

ORGANIC ANALYSES REPORT

Sampling Agency SWM
Field Number 3 Analyses by RLH/JWB/JBH Checked by CRJ
Laboratory Sample Number 0912 Date of Collection 10-17-85 Date Received 10-18-85
Sample Collected by JE/WH Type of Sample Sediment Date Completed 03-06-86
Sample Identification Hamilton Concrete Co - Swampy area South of D. M. Stewart

Compound	Amount	Compound	Amount
4-Chloro-3-methyl phenol	ND	PCB-1016	ND
2-Chlorophenol		PCB-1221	
2,4-Dichlorophenol		PCB-1232	
2,4-Dimethylphenol		PCB-1242	
2,4-Dinitrophenol		PCB-1248	
2-Methyl-4,6-Dinitrophenol		PCB-1254	
2-Nitrophenol		PCB-1260	
4-Nitrophenol		Isophorone	
Pentachlorophenol		Nitrobenzene	
Phenol		2,4-Dinitrotoluene	
2,4,6-Trichlorophenol		2,6-Dinitrotoluene	
Benzidine	NA	Acenaphthene	
3,3'-Dichlorobenzidine	NA	Acenaphthylene	
Benzyl Butyl Phthalate	97.1 µg/kg	Anthracene	
Bis (2-ethyl hexyl) phthalate	ND	Benzo (a) pyrene	
Di-N-butylphthalate	210 µg/kg	Benzo (b) fluoranthene	
Di-N-octylphthalate	ND	Benzo (k) fluoranthene	
Diethylphthalate	ND	Benzo (gni) perylene	*
Dimethylphthalate	ND	Chrysene	*
N-Nitrosodimethylamine		Dibenzo (ah) anthracene	*
N-Nitrosodiphenylamine		Fluoranthene	*
N-Nitrosodi-N-propylamine		Fluorene	ND
Aldrin		Indeno (1,2,3, cd) pyrene	*
Alpha BHC		Naphthalene	ND
Beta BHC		Phenanthrene	ND
Delta BHC		Pyrene	*
Gamma BHC		Bis (2-chloroisopropyl) ether	ND
Chlordane		Bis (2-chloroethyl) ether	
P,P-DDD		Bis (2-chloroethoxy) ether	
P,P-DDE		4-Chlorophenylphenyl ether	
P,P-DDT		4-Bromophenylphenyl ether	
Dieldrin		Hexachlorocyclopentadiene	
Endosulfan I		Hexachlorobenzene	
Endosulfan II		Hexachloro 1,3 Butadiene	
Endosulfan Sulfate		Hexachloroethane	
Endrin		1,2 Dichlorobenzene	
Endrin Aldehyde		1,3 Dichlorobenzene	
Heptachlor	7.70 µg/kg	1,4 Dichlorobenzene	
Heptachlor Epoxide	ND	1,2,4 Trichlorobenzene	
Toxaphene	ND	2-Chloronaphthalene	
		Benz(a)anthracene	*

Remarks

N.D. - None Detected µg/L - parts per billion µg/kg - parts per billion

* - Small amounts of these PNA's were detected but cannot quantitate due to interference

Tennessee Department of Health & Environment
Bureau of Laboratory Services
Environmental Laboratories (Lab No. ________)

SAMPLE IDENTIFICATION TAG

1. Source of Sample and COMPLETE Sample Identification D.M. Steward Co., E 36th Street, Chattanooga; composite soil sample from 0"-18" depth in settling pond area apx. 50' NE of fill edge on property belonging to Hamilton Concrete Co.

912

2. County Hamilton Nearest Town or City Chattanooga
3. Type of Sample grab soil (composite)
4. Date Collected 10/17/85 Time Collected 1228 EST
5. Name of Sampler (Please Print) Walker Howell, Janet Eldridge,
6. Names of Others Present at Time Sample Collected G.S. Caruthers, David Holt, Riley Castleberry
7. Field No. 3 Approx. Vol. of Sample 1 pint
8. Number of other samples collected at same time at this point ~~1~~ 3
9. Describe field collection procedure and special handling or preservation of this sample Hole dug w/shovel to 18" depth; soil from bottom of hole and excavated material placed in aluminum pan and composited w/SS spoon, then placed in cottage cheese container and placed in ice chest.
10. Describe how sample conveyed or transported to laboratory Sample secured in ice chest, transported in State vehicle to laboratory in Nashville, Tn.
11. Sample sealed by JEE Date sample sealed 10/17/85
12. Requested Analyses ~~Total Metals~~, Total organics

PH-2493

13. Custody of Samples (Please Sign)

(a) Collected by Walker P. Howell (date) 10/17/85 (time) 1228 EST

delivered to ________ (date) ________ (time) ________

(b) Received by ________ (date) ________ (time) ________

delivered to ________ (date) ________ (time) ________

(c) Received by ________ (date) ________ (time) ________

delivered to ________ (date) ________ (time) ________

(d) Received by ________ (date) ________ (time) ________

delivered to ________ (date) ________ (time) ________

(e) Received in laboratory by RNY (date) 10-18-85 (time) 1500

from WPH (date) 10-18-85 (time) 1500

(f) Logged in by RNY (date) 10-18-85 (time) 1500

14. Field Analyses and Results at Sampling Point Described in Item 1:

Analysis	Result	Date	Time	Analyst

15. Remarks ________

FEDERAL SUPERFUND
343.38-11

ORGANIC ANALYSES REPORT

Sampling Agency SWM
Field Number 3
Laboratory Sample Number 913
Sample Collected by JE/WH
Sample Identification
Field Duplicate to # 912

Analyses by RLH/JWB/BDU
Date of Collection 10-17-85
Type of Sample Sediment

Checked by CRB
Date Received 10-18-85
Date Completed 03-06-86

Compound	Amount	Compound	Amount
4-Chloro-3-methyl phenol	ND	PCB-1016	ND
2-Chlorophenol		PCB-1221	
2,4-Dichlorophenol		PCB-1232	
2,4-Dimethylphenol		PCB-1242	
2,4-Dinitrophenol		PCB-1248	
2-Methyl-4,6-Dinitrophenol		PCB-1254	
2-Nitrophenol		PCB-1260	
4-Nitrophenol		Isophorone	
Pentachlorophenol		Nitrobenzene	
Phenol		2,4-Dinitrotoluene	
2,4,6-Trichlorophenol		2,6-Dinitrotoluene	
Benzidine	NA	Acenaphthene	
3,3'-Dichlorobenzidine	NA	Acenaphthylene	
Benzyl Butyl Phthalate	37.6 µg/Kg	Anthracene	
Bis (2-ethyl hexyl) phthalate	ND	Benzo (a) pyrene	
Di-N-butylphthalate	68.7 µg/Kg	Benzo (b) fluoranthene	*
Di-N-octylphthalate	ND	Benzo (k) fluoranthene	ND
Diethylphthalate	ND	Benzo (ghi) perylene	*
Dimethylphthalate	ND	Chrysene	*
N-Nitrosodimethylamine		Dibenzo (ah) anthracene	*
N-Nitrosodiphenylamine		Fluoranthene	*
N-Nitrosodi-N-propylamine		Fluorene	ND
Aldrin		Indeno (1,2,3, cd) pyrene	*
Alpha BHC		Naphthalene	ND
Beta BHC		Phenanthrene	*
Delta BHC		Pyrene	*
Gamma BHC		Bis (2-chloroisopropyl) ether	ND
Chlordane		Bis (2-chloroethyl) ether	
P,P-DDD		Bis (2-chloroethoxy) ether	
P,P-DDE		4-Chlorophenylphenyl ether	
P,P-DDT		4-Bromophenylphenyl ether	
Dieldrin		Hexachlorocyclopentadiene	
Endosulfan I		Hexachlorobenzene	
Endosulfan II		Hexachloro 1,3 Butadiene	
Endosulfan Sulfate		Hexachloroethane	
Endrin		1,2 Dichlorobenzene	
Endrin Aldehyde		1,3 Dichlorobenzene	
Heptachlor	9.66 µg/Kg	1,4 Dichlorobenzene	
Heptachlor Epoxide	ND	1,2,4 Trichlorobenzene	
Toxaphene	ND	2-Chloronaphthalene	
		Benz(a)anthracene	*

Remarks

N.D. - None Detected µg/L - parts per billion µg/kg - parts per billion

* - Small amounts of these PNA's were detected but cannot quantitate due to interference

DUPLICATE

Tennessee Department of Health & Environment
Bureau of Laboratory Services
Environmental Laboratories

(Lab No. ________)

SAMPLE IDENTIFICATION TAG

1. Source of Sample and COMPLETE Sample Identification D.M. Steward Co., E 36TH Street, Chattanooga, Tn.; composite soil sample from 0"-18" depth in settling pond area apx. 50' NE of fill edge on property belonging to Hamilton Concrete Co.

913

2. County Hamilton Nearest Town or City Chattanooga
3. Type of Sample grab soil (composite)
4. Date Collected 10/17/95 Time Collected 12:30 EST
5. Name of Sampler (Please Print) Walker Howell, Janet Eldridge
6. Names of Others Present at Time Sample Collected G.S. Caruthers, David Holt, Riley Castleberry
7. Field No. 3d Approx. Vol. of Sample 1 pint
8. Number of other samples collected at same time at this point 3
9. Describe field collection procedure and special handling or preservation of this sample Hole dug w/shovel to 18" depth; soil from bottom of hole and excavated material placed in aluminum pan and composited w/SS spoon, then placed in cottage cheese container and placed in ice chest.
10. Describe how sample conveyed or transported to laboratory Sample secured in ice chest, transported in State vehicle to laboratory in Nashville, Tn.
11. Sample sealed by JEE Date sample sealed 10/17/95
12. Requested Analyses Total Metals, Total organics

PH-2493

13. Custody of Samples (Please Sign)

(a) Collected by	Walker F. Howell	(date)	10/17/85	(time)	1228 EST
delivered to		(date)		(time)	
(b) Received by		(date)		(time)	
delivered to		(date)		(time)	
(c) Received by		(date)		(time)	
delivered to		(date)		(time)	
(d) Received by		(date)		(time)	
delivered to		(date)		(time)	
(e) Received in laboratory by	RNY	(date)	10-18-85	(time)	1500
from	WH	(date)	10-18-85	(time)	1500
(f) Logged in by	RNY	(date)	10-18-85	(time)	1500

14. Field Analyses and Results at Sampling Point Described in Item 1:

Analysis	Result	Date	Time	Analyst

15. Remarks

FEDERAL SUPERFUND
343.38-11

-Federal Superfund 343.38-

REPORT OF ANALYSES

r · of Laboratory Services — Tennessee Department of Health and Environment

URCE D.M. Steward, Chattanooga, TN — Mile — NOV 29 1985

ENTIFICATION Standing water, south of parking lot across street from D.M. Steward plant

eld Number 4 — Collected By WFH JEE — Primary Station Number — Date Collected 10/17/85

ne Collected 1300 — Sample Depth (ft) — Laboratory No. Scm 768

LEGAL

-Temperature °C		2	340-C.O.D. mg/L (High Level		12
-D.O. mg/L		3	335-C.O.D. mg/L (Low Level)		13
0-5-day B.O.D. 20°C mg/L		4	70508 Acidity Total - Hot mg/L		14
3-pH, Lab.		5	412-Alkalinity (Net) mg/L		15
0-pH, Field		6	38260-MBAS mg/L		16
-App. Color Pt - Co units		7	95-Conductivity Micromho 25 °C		17
-True Color Pt - Co units		8	1105-Aluminum as Al ug/L		18
-Turbidity NTU		9	1007-Barium as Ba ug/L	535	19
0-Total Alk. as $CaCO_3$ mg/L		10	1032-Chromium-Hex. as Cr. ug/L		20
5-Phth. Alk. As $CaCO_3$ mg/L		11	1033-Chromium-Tri. as Cr. ug/L		21
7-Acidity as $CaCO_3$ mg/L		12	1034-Chromium-total as Cr. ug/L	11	22
0-Total Hardness as $CaCO_3$		13	1037-Cobalt as Co ug/L		23
0-Calcium as $CaCO_3$ mg/L		14	1147-Selenium-total as Se ug/L	<1	24
7-Magnesium as Mg mg/L		15	1145-Selenium (Diss.) as Se ug/L		25
9-Sodium as Na mg/L		16	1077-Silver as Ag ug/L	<1	26
7-Potassium as K mg/L		17	32730-Phenols ug/L		27
0-Total Residue mg/L		18	1022-Boron-Total as B ug/L		28
0-Sus. Residue mg/L		19	615-Nitrite Nitrogen as N mg/L		29
0300-Diss. Residue mg/L		20	620-Nitrate Nitrogen as N mg/L		30
501-Coliform No./100 ml		21	405-Free CO_2 mg/L		1
616-Fecal Coliform No. 100 ml.		22	505-Total Vol. Residue mg/L		2
679-Fecal Strep. No. 100 ml		23	535-Vol. Sus. Residue mg/L		
5-Total Kjl. Nitrogen as N mg/L		24	545-Settleable Residue mL/L		
0-NO_3 & NO_2 as N mg/L		25	666-Diss. Phosphate as P mg/L		
97-Antimony as Sb ug/L		26	745-Sulfide, total as S mg/L		
45-Iron as Fe ug/L		27	746-Sulfide, Dissolved as S mg/L		
55-Manganese as Mn ug/L		28	369-Cl_2, Demand, 30 min. mg/L		
0-Chloride as Cl mg/L		29	50064-Cl_2, Free Res. mg/L		
0-Fluoride as F mg/L		30	50060-Cl_2, Combined Res. mg/L		1
5-Total Phosphate as P mg/L		1	690-total Carbon mg/L		1
5-Sulfate as SO_4 mg/L		2	550-Oil and Grease mg/L		1
0-Total Organic Carbon mg/L		3	720-Cyanide as CN mg/L		1
67-Nickel as Ni ug/L		4	32240-Tannin and Lignin mg/L		1
900-Mercury-Total as Hg ug/L		5	610-Ammonia Nitrogen as N mg/L		1
51-Lead as Pb ug/L	80	6	605-Organic Nitrogen as N mg/L		1
42-Copper as Cu ug/L	395	7	58-Flow Rate CFM		1
02-Arsenic as As ug/L		8	61-Flow Rate CFS, Instaneous		1
027-Cadmium as Cd ug/L	25	9	60-Flow Rate CFS, Mean Daily		1
92-Zinc as Zn ug/L	6950	10			
5 Silica as SiO_2 mg/L		11			

emarks: ~~extractable organics~~ PY and total metals

PH-05

Tennessee Department of Health & Environment
Bureau of Laboratory Services
Environmental Laboratories

(Lab No. ____________)

SAMPLE IDENTIFICATION TAG

1. Source of Sample and COMPLETE Sample Identification D.M. Steward, Chattanooga, TN
Standing water in swampy area south ~~across~~ SEE parking lot across street from D.M. Steward plant
2. County Hamilton Nearest Town or City Chattanooga
3. Type of Sample Water
4. Date Collected 10/17/85 Time Collected 1300 EST
5. Name of Sampler (Please Print) Walker F. Howell, Janet E. Eldridge
6. Names of Others Present at Time Sample Collected Gordon C. Caruthers, David Holt, Riley Castleberry
7. Field No. 4 Approx. Vol. of Sample 4/500 ml. bottles 1 liter WFH
8. Number of other samples collected at same time at this point 4
9. Describe field collection procedure and special handling or preservation of this sample Water collected with 250 ml erlenmyer flask and poured into 2 500 ml glass bottles and 2 500 ml plastic bottles
10. Describe how sample conveyed or transported to laboratory state vehicle
11. Sample sealed by Janet E. Eldridge Date sample sealed 10/17/85
12. Requested Analyses total metals and ~~extractable organics~~ EVY

PH-2493

13. Custody of Sample (Please Sign)
(a) Collected by Janet E. Eldridge (date) 10/17/85 (time) 1300 EST
delivered to ______ (date) ______ (time) ______
(b) Received by ______ (date) ______ (time) ______
delivered to ______ (date) ______ (time) ______
(c) Received by ______ (date) ______ (time) ______
delivered to ______ (date) ______ (time) ______
(d) Received by ______ (date) ______ (time) ______
delivered to ______ (date) ______ (time) ______
(e) Received in laboratory by ______ (date) ______ (time) ______
from ______ (date) ______ (time) ______
(f) Logged in by ______ (date) ______ (time) ______

14. Field Analyses and Results at Sampling Point Described in Item 1:

Analysis	Result	Date	Time	Analyst

15. Remarks

FEDERAL SUPERFUND
343.38-II

Site No. TND 003327251

Reference No. 10

Dangerous Properties of Industrial Materials

Sixth Edition

N. IRVING SAX

Assisted by:

Benjamin Feiner/Joseph J. Fitzgerald/Thomas J. Haley/Elizabeth K. Weisburger

VNR VAN NOSTRAND REINHOLD COMPANY
New York

ipr-rbt LD50:250 mg/kg	JPETAB 42,253,31
scu-rbt LDLo:500 mg/kg	JPETAB 49,187,33
ivn-rbt LDLo:400 mg/kg	JPETAB 60,125,37

THR: MOD by ingestion. Large doses cause marked depression (sometimes preceded by excitation), prolonged coma and death. Allergic skin reactions may occur from contact. Has been implicated in development of aplastic anemia. A truly habit forming drug. An exper TER in mus. MUT data.
Fire Hazard: Slight, when heated.
Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

BARBITURATES

SYNS:

DERIVATIVES OF BARBITURIC ACID; I.E.	BARBITONE
BARBITAL	BARBITAL SODIUM

THR: MOD by ingestion. Large doses cause marked depression (sometimes preceded by excitation), prolonged coma and death. Allergic skn reactions may occur from contact. Has been implicated in development of aplastic anemia. A truly habit forming drug.
Fire Hazard: Slight, when heated.

BARBITURIC ACID

mf: $C_4H_4O_3N_2$; mw: 128.1

Crystals or white to yellow-white powder. mp: 245°; bp: 260° (decomp).

THR: MOD irr to skin, eyes and mu mem. An allergen. Has no hypnotic properties.
Fire Hazard: Slight.

BARBITURIC ACID, 5,5-DIETHYL MIXED WITH 4-(DIMETHYLAMINO)ANTIPYRINE

CAS RN: 69401338 NIOSH #: CD 2630000

SYN: PYRABITAL

TOXICITY DATA: 3	CODEN:
scu-mus TDLo:600 mg/kg (9-11D preg)	TJADAB 16,118,77

THR: An exper TER.
Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

BARIUM

CAS RN: 7440393 NIOSH #: CA 8370000
af: Ba; at wt: 137.36

Silver-white, slightly lustrous, somewhat malleable metal. mp: 725°, bp: 1640°, d: 3.5 @ 20°, vap. press: 10 mm @ 1049°.

TOXICITY DATA: CODEN:
TLV: Air: 500 ug/m3 DTLVS* 4,35,80. Reported in EPA TSCA Inventory, 1980.
THR: No data. See also barium compounds.
Fire Hazard: Dangerous and explosive in form of dust when exposed to heat or flame or by chemical reaction.
Incomp: Acids, CCl_4, $C_2Cl_3F_3$, $C_2H_2FCl_3$, C_2Cl_4, C_2HCl_3 and water. 1,1,2-trichloro trifluoro ethane, fluorotrichloroethane, fluorotrichloromethane, trichloroethylene can detonate in contact with Ba.
For further information see Vol. 1, No. 7 and Vol. 3, No. 4 of *DPIM Report.*

BARIUM ACETATE

CAS RN: 543806 NIOSH #: AF 4550000
mf: $C_4H_6O_4 \cdot Ba$; mw: 255.44

White cryst. Water sol.

SYNS:

ACETIC ACID, BARIUM SALT	OCTAN BARNATY (CZECH)
BARIUM DIACETATE	

TOXICITY DATA: 3-2	CODEN:
orl-rat LD50:921 mg/kg	MarJV# 29MAR77
ivn-mus LD50:11 mg/kg	TXAPA9 22,150,72
scu-rbt LDLo:96 mg/kg	EQSSDX 1,1,75
ivn-rbt LDLo:12 mg/kg	EQSSDX 1,1,75

OSHA Standard: Air: TWA 500 ppm (SCP-X) FEREAC 39,23540,74. Reported in EPA TSCA Inventory, 1980.
THR: HIGH ivn, scu. MOD orl.
Disaster Hazard: When heated to decomp it emits acrid smoke.

BARIUM ACETYLIDE

mf: C_2Ba; mw: 161.35

Incomp: Halogens, selenium.

BARIUM AZIDE

CAS RN: 18810587 NIOSH #: CQ 8500000
mf: BaN_6; mw: 221.40

Monoclinic prisms. mp: $-N_2$ @ about 120°, bp: explodes, d: 2.936.

TOXICITY DATA: 3 CODEN:
Aquatic Toxicity Rating: TLm96:100-10 ppm WQCHM* 2,-,74. Reported in EPA TSCA Inventory, 1980.
THR: See barium compounds (sol) and azides.
Explosion Hazard: Mod when shocked or exposed to heat. Around 275°, spont flammable in air. Very unstable.
Disaster Hazard: Dangerous; shock and heat will explode it.

BARIUM AZIDE (WET)

CAS RN: 18810587 NIOSH #: CQ 8510000

Compound contains 50% or more water (FEREAC 41,15972,76)

TOXICITY DATA: 3 CODEN:
DOT: Flammable Solid, Label: Flammable Solid FEREAC 41,57018,76. Reported in EPA TSCA Inventory, 1980.
THR: HIGH tox. See also barium compounds and azides.
Disaster Hazard: Possibly explosive.

TOXICITY DATA: 3 CODEN:

DOT: Flammable Liquid, Label: Flammable Liquid FEREAC 41,57018,76. Reported in EPA TSCA Inventory, 1980.

Fire Hazard: Very dangerous, when exposed to heat or flame.

To Fight Fire: Alcohol foam.

Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

COLTSFOOT

NIOSH #: GJ 9880000

It is herb of the tribe Senecione and from family Compositae (GANNA2 67,125,76)

SYNS:

KAN-TO-KA (JAPANESE) TUSSILAGO FARFARA L

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:4800 gm/kg/77W-C:CARC	GANNA2 67,125,76

THR: An exper CARC to rats via orl.

COMPOUND 69/183

CAS RN: 27114110 NIOSH #: UQ 4810000
mf: $C_{22}H_{25}FN_2O \cdot 2ClH$; mw: 425.41

SYN: 3-(GAMMA-(p-FLUOROBENZOYL)PROPYL)-2,3,4,4a,5,6-HEXAHYDRO-1(H)-PYRAZINO(1,2A)QUINOLINE HCl

TOXICITY DATA: 3-2	CODEN:
orl-rat LD50:800 mg/kg	DRFUD4 4,185,79
ipr-rat LD50:161 mg/kg	ARZNAD 28,1641,78
orl-mus LD50:1 gm/kg	DRFUD4 4,185,79
ipr-mus LD50:300 mg/kg	JMCMAR 13,516,70
ivn-mus LD50:95 mg/kg	ARZNAD 28,1641,78

THR: HIGH ipr, ivn, orl.

Disaster Hazard: When heated to decomp it emits very tox fumes of F^-, NO_x and HCl.

CONIUM MACULATUM

NIOSH #: GL 1223600

Colorless, oily liquid with mousy odor; bp: 166.5°, fp: −2.5°, d: 0.844-0.848 @ 20°/4°. Lupine Plant whose toxic agent is Coniine, fed as green or dried plant (CTOXAO 12,49,78)

TOXICITY DATA: 3	CODEN:
orl-ctl TDLo:29 gm/kg/(45-75D) preg):TER	CTOXAO 12,49,78

THR: Tox principle of poison hemlock. Ingestion causes weakness, drowsiness, nausea, vomiting, labored respiration, paralysis, asphyxia, death from paralysis of the nervous system. In small doses it is a sedative. Poisoning is treated by evacuating the stomach and administering tannic acid.

Fire Hazard: Slight, when heated.

COPPER

CAS RN: 7440508 NIOSH #: GL 5325000
Af: Cu; Aw: 63.54

A metal with a distinct reddish color. mp: 1083°, bp: 2324°, d: 8.92, vap. press: 1 mm @ 1628°.

SYNS:

BRONZE POWDER
C.I. 77400
COPPER BRONZE
GOLD BRONZE

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:152 mg/kg (22W pre)	GISAAA 45(3),8,80
orl-rat TDLo:1520 ug/kg (22W pre)	GISAAA 45(3),8,80
orl-rat TDLo:1210 ug/kg (35W pre)	GISAAA 42(8),30,77
ipl-rat TDLo:100 mg/kg TFX:ETA	AIHAAP 41,836,80
orl-hmn TDLo:120 ug/kg:GIT	PHRPA6 73,910,58

TLV: Air: 0.2 mg/m3 (fume) DTLVS* 4,104,80; air: 1 mg/m3 (dust mist) DTLVS* 4,104,80. *Toxicology Review:* TRBMAV 33(1),85,75; QURBAW 7(1),75,74; JAVMA4 164(3),277,74; IJMDAI 10(4),416,74; KOTTAM 11(11),1300,75; FOREAE 7,313,42; MIBUBI 9(4),321,75; BEXTAR 12,102,69; 85DHAX Cu,41,74; AMTODM 3,209,77. "NIOSH Manual of Analytical Methods" VOL 5 173#. Reported in EPA TSCA Inventory, 1980.

THR: HIGH hmn via orl. See copper compounds.

Fire and Explosion Hazard: Reacts violently with C_2H_2, NH_4NO_3, bromates, chlorates, iodates, Cl_2, ClF_3, (Cl_2 + OF_2), ethylene oxide, F_2, H_2O_2, hydrazine mononitrate, hydrazoic acid, H_2S, $Pb(N_3)_2$, K_2O_2, NaN_3, Na_2O_2.

Incomp: 1-bromo-2-propyne.

For further information see Vol. 1, No. 5 of *DPIM Report.*

COPPER ACETATE

CAS RN: 142712 NIOSH #: AG 3480000
mf: $C_4H_6O_4 \cdot Cu$; mw: 181.64

Greenish blue powd or small crystals.

SYNS:

ACETIC ACID, CUPRIC SALT
COPPER(2+) ACETATE
COPPER(II) ACETATE
COPPER DIACETATE
COPPER(2+) DIACETATE
CRYSTALLIZED VERDIGRIS
CRYSTALS OF VENUS
CUPRIC ACETATE
CUPRIC DIACETATE
NEUTRAL VERDIGRIS
OCTAN MEDNATY (CZECH)

TOXICITY DATA: 2	CODEN:
scu-rat TDLo:40 mg/kg (7-10D preg)	CRSBAW 166,1237,72
orl-rat LD50:595 mg/kg	MarJV# 29MAR77

Reported in EPA TSCA Inventory, 1980.

THR: MOD orl.

Disaster Hazard: When heated to decomp it emits acrid smoke and irr fumes.

COPPER(II) ACETYLIDE

mf: C_2Cu; mw: 87.56

Sensitive to impact, friction and heat.

SYNS:

1-DODECANETHIOL	M-LAURYL MERCAPTAN
M-DODECYL MERCAPTAN	1-MERCAPTODODECANE
1-DODECYL MERCAPTAN	NCI-C60935

TOXICITY DATA:	CODEN:
cyt-rat-ihl 5020 ug/m3/16W	BZARAZ 27,102,74

Reported in EPA TSCA Inventory, 1980.
THR: See mercaptans. MUT data.
Fire Hazard: Low.
To Fight Fire: Alcohol foam.
Disaster Hazard: When heated to decomp it emits tox fumes of SO_x.

LAURYLPYRIDINIUM LAURYLXANTHATE

CAS RN: 14917965 NIOSH #: UU 5775000
mf: $C_{17}H_{30}N \cdot C_{13}H_{25}OS_2$; mw: 509.98

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg/24H MOD	28ZPAK -,174,72
eye-rbt 20 mg/24H SEV	28ZPAK -,174,72
orl-rat LD50:802 mg/kg	28ZPAK -,174,72

THR: MOD orl. A skn, eye irr.
Disaster Hazard: When heated to decomp it emits very tox fumes of NO_x and SO_x.

LAURYL SULFATE, SODIUM SALT, CONDENSED WITH 3 MOLES OF ETHYLENE OXIDE

NIOSH #: OF 5725000

SYNS:

SODIUM SALT OF SULFATED BROAD-CUT COCONUT ETHOXY(3EO) ALCOHOL	SODIUM SALT OF SULFATED ETHOXYLATE OF BROAD-CUT LAURYL ALCOHOL

TOXICITY DATA: 2	CODEN:
skn-rbt 10 mg MLD	JSCCA5 22,411,71
skn-rbt 230 mg/5W open MLD	JSCCA5 22,411,71
skn-gpg 115 mg/5W open MLD	JSCCA5 22,411,71

THR: A skn irr.
Disaster Hazard: When heated to decomp it emits tox fumes of SO_x.

LAVANDIN OIL

CAS RN: 8022159 NIOSH #: OF 6097500

Main constituent is Linalool; found in plant Lavanoula Hybrida Reverchon; prepared by steam distillation of the flowering stalks of the plant.

SYN: OIL OF LAVANDIN

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg/24H MLD	FCTXAV 14,443,76

Reported in EPA TSCA Inventory, 1980.
THR: A skn irr.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LAVATAR

NIOSH #: OF 6097840

Coal tar distillates in a shampoo base.

TOXICITY DATA:	CODEN:
mma-sat 25 ug/plate	TOLED5 3,325,79

THR: MUT data.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LAVENDER ABSOLUTE

NIOSH #: OF 610[illegible]

Found in the flowers of Lavandula Officinalis chan. The main constituent is Linalyl Acetate; prepared from alcoholic extract of a residue, which is extracted from plant material using an organic solvent; a dark green liquid.

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg/24H MLD	FCTXAV 14,443,76
orl-rat LD50:4250 mg/kg	FCTXAV 14(5),443,76

THR: LOW orl; A skn irr.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LAVENDER OIL

CAS RN: 8000280 NIOSH #: OF 6110[illegible]

Main constituent is linalyl acetate. Found in the plant Lavandulaofficinalif choix (Fam. Labiate). Prepared by steam distillation of the flowering stalks of the plant

SYNS:

LAVENDEL OEL (GERMAN)	OIL OF LAVENDER

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg/24H MLD	FCTXAV 14,443,76
orl-rat LD50:9040 mg/kg	PHARAT 14,435,59

Reported in EPA TSCA Inventory, 1980.
THR: LOW orl. A skn irr.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LD-813

CAS RN: 64083052 NIOSH #: OF 6730000

Commercial mixture of aromatic amines containing approx. 40% MOCA

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:37 gm/kg/2Y-C:CARC	TXAPA9 31,159,75

THR: An exper CARC. See also aromatic amines
Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

LEAD

CAS RN: 7439921 NIOSH #: OF 7525000
mf: Pb; mw: 207.19

Bluish-gray, soft metal. mp: 327.43°, bp: 1740°, d: 11.34 @ 20°/4°. vap. press: 1 mm @ 973°.

SYNS:

C.I. 77575	LEAD S2
LEAD FLAKE	OLOW (POLISH)

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:790 mg/kg (MGN)	AEHLAU 23,102,71
orl-rat TDLo:1140 mg/kg (14D pre-21D post)	PHMCAA 20,201,78
orl-mus TDLo:1120 mg/kg (MGN)	AEHLAU 23,102,71
orl-mus TDLo:6300 mg/kg (1-21D preg)	EXPEAM 31,1312,75
orl-mus TDLo:12600 mg/kg (1-21D preg)	EXPEAM 31,1312,75
orl-mus TDLo:4800 mg/kg (1-16D preg)	BECTA6 18,271,77
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXPEAM 25,56,69
orl-dom TDLo:662 mg/kg (1-21W preg)	TXAPA9 25,466,73
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXPEAM 25,56,69
orl-wmn TDLo:450 mg/kg/6Y:CNS	JAMAAP 237,2627,77
ipr-rat LDLo:1000 mg/kg	EQSSDX 1,1,75
orl-pgn LDLo:160 mg/kg	HBAMAK 4,1289,35

Carcinogenic Determination: Indefinite IARC** 23, 325,80.

TLV: AIR: 0.15 mg/m3 DTLVS* 4,243,80; *Toxicology Review:* TRBMAV 33(1),85,75; PGMJAO 51(601),783,75; JDSCAE 58(12),1767,75; IRXPAT 12,1,73; CTPHBG 55,147,71; CTOXAO 6(3),377,73; QURBAW 7(1),75,74; RREVAH 54,55,75; JAVMA4 164(3),277,74; AEMBAP 40,239,73; CTOXAO 5(2),151,72; FOREAE 7,313,42; KOTTAM 11(11),1300,75; GEIGAI 20(3),291,73; STEVA8 2(4),341,74; CLCHAU 19,361,73; AJMEAZ 38,409,65; 85DHAX PB,254,72; PDTNBH 6,204,77; AMTODM 3,209,77. OSHA Standard: Air: TWA 200 ug/m3 (SCP-O) FEREAC 39,23540,74. Occupational Exposure to Inorganic Lead recm std: Air: TWA 0.10 mg(Pb)/m3 NTIS**. "NIOSH Manual of Analytical Methods" VOL 1 102,191,195,200,208,214,262, VOL 3 S341. Reported in EPA TSCA Inventory, 1980.

THR: See lead compounds. A hmn CNS. HIGH orl; MOD irr. A common air contaminant. It is a ± CAR of the lungs and kidney and an exper TER.

Fire Hazard: Mod, in the form of dust when exposed to heat or flame. See also powdered metals.

Explosion Hazard: Mod, in the form of dust when exposed to heat or flame.

Incomp: NH_4NO_3, ClF_3, H_2O_2, NaN_3, Na_2C_2, Zr. disodium acetylide; oxidants.

Disaster Hazard: Dangerous; when heated, emits highly tox fumes; can react vigorously with oxidizing materials.

For further information see Vol. 1, No. 1 of *DPIM Report.*

LEAD ACETATE

CAS RN: 301042 NIOSH #: AI 5250000

mf: $C_4H_6O_4 \cdot Pb$; mw: 325.29

Trihydrate, colorless crystals or white granules or powder. Slightly acetic odor; slowly effloresces; d: 2.55; mp: 75° when rapidly heated. Decomp above 200°; very sol in glycerol. Keep well closed.

SYNS:

ACETIC ACID LEAD (2+) SALT	LEAD DIBASIC ACETATE
ACETATE DE PLOMB (FRENCH)	NORMAL LEAD ACETATE
BLEIACETAT (GERMAN)	PLUMBOUS ACETATE
LEAD (2+) ACETATE	SALT OF SATURN
LEAD(II) ACETATE	SUGAR OF LEAD
LEAD DIACETATE	

TOXICITY DATA: 3	CODEN:
dns-rat-ipr 50 ug/kg	PSEBAA 143,446,73
spm-mus-par 1 gm/kg	ARTODN 46,159,80
orl-rat TDLo:7854 mg/kg (6-16D preg)	FCTXAV 13,629,75
orl-rat TDLo:1800 mg/kg (1-22D preg/14D post)	TOLED5 7,373,80
orl-rat TDLo:113 gm/kg (70D pre-21D post)	PBBHAU 8,347,78
orl-mus TDLo:3150 mg/kg (1-21D preg)	CRSBAW 170,1319,76
orl-mus TDLo:4800 mg/kg (1-8D preg)	CRSBAW 172,1037,78
orl-mus TDLo:9 gm/kg (7-21D preg)	CRSBAW 170,1319,76
ipr-mus TDLo:35 mg/kg (8D preg)	BIMDB3 30,223,79
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXMPA6 7,208,67
ivn-ham TDLo:50 mg/kg (8D preg)	EXPEAM 25,56,69
ipr-pgn LDLo:150 mg/kg	ARTODN 46,265,80
cyt-hmn:lym 1 mmol/L/24H	TXCYAC 10,67,78
cyt-mus-orl 16800 mg/kg/4W	JTEHD6 2,619,77
cyt-mky-orl 5760 mg/kg/64W	MUREAV 45,77,77
ipr-mus TDLo:15 mg/kg/(8D preg):TER	BIMDB3 30,223,79
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXMPA6 7,208,67
orl-rat TDLo:250 gm/kg/47W-C:ETA	BJCAAI 16,283,62
ipr-rat LDLo:204 mg/kg	JPETAB 38,161,30
ipr-mus LD50:120 mg/kg	COREAF 256,1043,63
orl-dog LDLo:300 mg/kg	HBAMAK 4,1289,35
scu-dog LDLo:80 mg/kg	HBAMAK 4,1289,35
ivn-dog LDLo:300 mg/kg	EQSSDX 1,1,75
scu-cat LDLo:100 mg/kg	HBAMAK 4,1289,35
scu-rbt LDLo:300 mg/kg	HBAMAK 4,1289,35
ivn-rbt LDLo:50 mg/kg	EQSSDX 1,1,75
scu-frg LDLo:1600 mg/kg	HBAMAK 4,1289,35

Carcinogenic Determination: Animal Positive IARC** 23,325,80; Human Suspected IARC** 23,325,80. *Toxicology Review:* ADTEAS 5,51,72; ENVRAL 13,36,77; 85DHAX Pb,256,72. OSHA Standard: Air: TWA 200 ug(Pb)/m3 (SCP-O) FEREAC 29,23540,74. Occupational Exposure to Inorganic Lead recm std: Air: TWA 0.10 mg(Pb)/m3 NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: MUT data. An exper + CARC, TER, ETA. A susp hmn CARC; HIGH ipr, orl, scu, ivn. See also lead compounds. A poison. An insecticide.

Disaster Hazard: When heated to decomp it emits tox fumes of Pb.

Incomp: $KBrO_3$; acids, sol sulfates, citrates, tartrates, chlorides, carbonates, alkalies, tannin phosphates, resorcinol, salicylic acid, phenol, chloral hydrate, sulfites, vegetable infusions, tinctures.

For further information see Vol. 1, No. 4 of *DPIM Report.*

LEAD ACETATE, BASIC

CAS RN: 1335326 NIOSH #: OF 8750000

mf: $C_4H_{10}O_8Pb_3$; mw: 807.71

• Mixture of 95% dimethylaminopropinonitrile and 5% bis-dimethylaminoethyl ether (DCTODJ 2,223,79)

TOXICITY DATA: 2	CODEN:
ipr-rat LDLo:2000 mg/kg	JEPTDQ 4(2-3),555,80
orl-rat LD50:2460 mg/kg	DCTODJ 2,223,79
skn-rbt LD50:445 mg/kg	DCTODJ 2,223,79

THR: MOD orl, skn. See also ethers.
Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

NIAX POLYOL L-56

NIOSH #: QR 4325000

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg open MLD	UCDS** 7/11/67

THR: MLD skn irr.

NIAX POLYOL LG-168

NIOSH #: QR 4375000

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg open MLD	UCDS** 1/7/71
orl-rat LD50:2830 mg/kg	UCDS** 1/7/71

THR: MOD orl. MLD skn irr.

NIAX POLYOL LHT-42

NIOSH #: QR 4400000

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg open MLD	UCDS** 4/29/69
orl-rat LD50:20 gm/kg	UCDS** 4/29/69

THR: LOW orl. MLD skn irr.

NIAX RO 350

CAS RN: 55840169 NIOSH #: QR 4420000

SYN: NIAX POLYOL RO-350

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg open MLD	UCDS** 4/1/65
orl-rat LD50:30 gm/kg	UCDS** 4/1/65

THR: LOW orl. MLD skn irr.

NIAX TRIOL 700

NIOSH #: QR 4450000

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg open MLD	UCDS** 6/15/71
orl-rat LD50:5660 mg/kg	UCDS** 6/15/71

THR: LOW orl. MLD skn irr.

NIAX TRIOL 3000

NIOSH #: QR 4575000

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg open MLD	UCDS** 6/15/71

THR: MLD skn irr.

NIAX TRIOL 6000

NIOSH #: QR 4600000

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg open MLD	UCDS** 6/15/71
orl-rat LD50:57 gm/kg	UCDS** 6/15/71

THR: LOW orl. MLD skn irr.

NIAZOL

CAS RN: 550992 NIOSH #: NJ 4375000
mf: $C_{14}H_{14}N_2 \cdot ClH$; mw: 246.76

SYNS:
2-(1-NAPHTHYLMETHYL)IMIDAZOLINE HYDROCHLORIDE
2-(1-NAPHTHYLMETHYL)-2-IMIDAZOLINE HYDROCHLORIDE

TOXICITY DATA: 3-2	CODEN:
ipr-rat LD50:50 mg/kg	JPETAB 86,284,46
scu-rat LD50:325 mg/kg	JPETAB 86,284,46
scu-mus LD50:170 mg/kg	JPETAB 86,280,46
scu-rbt LD50:950 mg/kg	JPETAB 86,284,46
ivn-rbt LD50:800 ug/kg	JPETAB 86,284,46
ims-rbt LD50:950 ug/kg	JPETAB 86,284,46

THR: HIGH ipr, scu, ivn, ims. MOD scu.
Disaster Hazard: When heated to decomp it emits very tox fumes of NO_x and HCl.

NICKEL

CAS RN: 7440020 NIOSH #: QR 5950000
af: Ni; aw: 58.71

A silvery-white, hard, malleable and ductile metal. d: 8.90 @ 25°, vap. press: 1 mm @ 1810°. Crystallizes as metallic cubes; mp: 1455°; bp: 2730°; Stable in air @ room temp.

SYNS:
C.I. 77775
NICKEL CATALYST, WET (DOT)
NICHEL (ITALIAN)
NICKEL SPONGE
PULVERIZED NICKEL
RANEY ALLOY
RANEY NICKEL

TOXICITY DATA: 3	CODEN:
otr-ham:emb 5 umol/L	TOXID9 1,132,81
orl-rat TDLo:158 mg/kg (MGN)	AEHLAU 23,102,71
scu-rat TDLo:3000 mg/kg/6W-I:ETA	JNCIAM 16,55,55
ims-rat TDLo:1000 mg/kg/17W-I:CAR	PAACA3 9,28,68
ipl-rat TDLo:1250 mg/kg/17W-I:ETA	TRBMAV 10,167,52
par-rat TDLo:40 mg/kg/52W-I:ETA	AEHLAU 5,445,62
imp-rat TDLo:250 mg/kg:CAR	JNCIAM 16,55,55
ims-mus TDLo:200 mg/kg:NEO	NCIUS* PH 43-64-886, SEPT,70
imp-rbt TDLo:165 mg/kg/2Y-I:NEO	JNCIAM 16,55,55
ihl-gpg TCLo:15 mg/m3/91W-I:ETA	AMPLAO 65,600,58
ims-ham TDLo:200 mg/kg/21W-I:ETA	PWPSA8 14,68,71
ims-rat TD:58 mg/kg:ETA	PAACA3 17,11,76
imp-rat TD:23 mg/kg:ETA	JNCIAM 16,55,55
ims-rat TD:125 mg/kg/13W-I:NEO	NCIUS* PH 43-64-886, JUL,68
ims-mus TD:800 mg/kg/13W-I:NEO	NCIUS* PH 43-64-886, JUL,68
ims-rat TD:90 mg/kg/18W-I:ETA	NCIUS* PH 43-64-886, AUG,69

Z

ZAMIA DEBILIS

NIOSH #: ZG 4600000

Dried, ground-up zamia tubers were used (85CVA2 5,197,70)

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:650 gm/kg/ 77W-C:ETA	85CVA2 5,197,70

THR: An exper ETA.

ZEARALENONE

CAS RN: 17924924 NIOSH #: DM 2550000
mf: $C_{18}H_{22}O_5$; mw: 318.40

l-form: crystals. mp: 164°-165°. sol in aqu alkali, ether, benzene, alc; almost insol in water. dl-form: crystals. mp: 187°-189°.

SYNS:
6-(10-HYDROXY-6-OXO-TRANS-1-UNDECENYL)-BETA-RESORCYCLIC ACID-N-LACTONE
NCI-C50226

TOXICITY DATA: 3	CODEN:
dnr-bcs 2500 mg/L	IRLCDZ 7,204,79
skn-gpg 50 mg/24H SEV	JANCA2 57,1121,74
mrc-bcs 100 ug/disc	CNREA8 36,445,76
orl-rat TDLo:10 mg/kg (6-15D preg)	BECTA6 15,678,76
orl-rat TDLo:100 mg/kg (6-15D preg)	BECTA6 15,678,76

Currently Tested by NTP for Carcinogenesis by Standard Bioassay Protocol as of December 1980. Reported in EPA TSCA Inventory, 1980.
THR: SEV skn irr in gpg. An exper TER. MUT data. Possible CARC.

ZETAR EMULSION

A shampoo containing coal tar derivatives (TOLED5 3,325,79)

NIOSH #: ZG 7250000

SYN: ZET

TOXICITY DATA:	CODEN:
mma-sat 10 ug/plate	TOLED5 3,325,79

THR: MUT data.

ZINC

CAS RN: 7440-66-6 NIOSH #: ZG 8600000
af: Zn; aw: 65.37

Bluish-white, lustrous metal. mp: 419.8°; bp: 908°; d: 7.14 @ 25°; vap. press: 1 mm @ 487°.

SYNS:
BLUE POWDER
C.I. 77945
C.I. PIGMENT BLACK 16
GRANULAR ZINC
ZINC DUST
ZINC POWDER

SKIN AND EYE IRRITATION DATA: 2	CODEN:
skn-hmn 300 ug/3D-I:MLD	85DKA8 -,127,77

TOXICITY DATA:	CODEN:
ihl-hmn TCLo:124 mg/M³/50M:PUL	AHYGAJ 72,358,10

Toxicology Review: QURBAW 7(1),75,74; ADTEAS 5,51,72; FOREAE 7,313,42; KOTTAM 11(11),1300,7; AMTODM 3,209,77.
"NIOSH Manual of Analytical Methods" VOL 5 173# NIAMAM*. Reported in EPA TSCA Inventory, 1980. Meets Criteria for Proposed OSHA Medical Records Rule FEREAC 47,30420,82.
THR: A hmn skn irr and PUL. See also zinc compounds. Pure zinc powder, dust, fume is relatively non-tox to humans via irr or ihl. The difficulty arises from oxidation of zinc fumes prior to ihal or presence of impurities such as Cd, Sb, As, Pb.
Fire Hazard: Mod, in the form of dust when exposed to heat or flame.
Spontaneous Heating: No.
Explosion Hazard: In the form of dust when reacted with acids.
Incomp: NH_4NO_3; BaO_2; $Ba(NO_3)_2$; Cd; CS_2; chlorates; Cl_2, ClF_3; CrO_3; (ethyl acetoacetate + tribromoneopentyl alcohol); F_2; hydrazine mononitrate; hydroxylamine; $Pb(N_3)_2$; (Mg + $Ba(NO_3)_2$ + BaO_2); $MnCl_2$; HNO_3; performic acid; $KClO_3$; KNO_3; K_2O_2; Se; $NaClO_3$; Na_2O_2; S; Te; H_2O; $(NH_4)_2S$; As_2O_3; CS_2; $CaCl_2$; NaOH; chlorinated rubber; catalytic metals; halocarbons; o-nitroanisole; nitrobenzene; non-metals; oxidants; paint primer base; pentacarbonyliron; transition metal halides; seleninyl bromide.
To Fight Fire: Special mixtures of dry chemical.
For further information see Vol. 1, No. 7 of *DPIM Report.*

ZINC ACETATE

CAS RN: 557346 NIOSH #: AK 1500000
mf: $C_4H_6O_4 \cdot Zn$; mw: 183.47

Astringent taste, d: 1.735; mp: 237°. Very sol in water; somewhat sol in alc. Crystals.

Site No. TND003327251

Reference No. 11

Site No. TND 003327251

Reference No. 12

1980 Census of Population and Housing

Census Tracts

CHATTANOOGA, TENN.-GA.

STANDARD METROPOLITAN STATISTICAL AREA

PHC80-2-118

Issued August 1983

U.S. Department of Commerce
Malcolm Baldrige, Secretary
Robert G. Dederick,
Under Secretary for
Economic Affairs

BUREAU OF THE CENSUS
Bruce Chapman, Director

Table P-1. **General Characteristics of Persons: 1980**—Con.

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Totals for split tracts in Hamilton County, Tenn.—Con. Tract 0114.01	Tract 0114.03	Tract 0114.04	Tract 0121	Marion County, Tenn. Tract 0501	Tract 0502	Tract 0503	Sequatchie County, Tenn. Tract 0601	Tract 0602
AGE									
Total persons	**11 083**	**6 917**	**7 747**	**5 733**	**7 952**	**8 753**	**7 711**	**6 391**	**2 214**
Under 5 years	803	497	487	403	653	671	518	498	183
5 to 9 years	964	558	545	409	685	767	592	549	185
10 to 14 years	1 015	630	601	494	742	757	599	585	211
15 to 19 years	1 024	636	671	511	721	877	724	594	211
20 to 24 years	870	556	634	483	639	671	621	500	183
25 to 34 years	2 157	1 178	1 190	912	1 233	1 360	1 110	1 020	349
35 to 44 years	1 604	893	980	767	1 029	1 139	841	802	282
45 to 54 years	1 190	830	1 073	751	767	944	848	613	218
55 to 64 years	836	573	840	531	634	736	776	512	187
65 to 74 years	429	361	494	320	554	574	674	446	129
75 years and over	191	205	232	152	295	257	408	272	76
3 and 4 years	295	185	180	153	290	290	205	193	64
16 years and over	8 090	5 094	5 990	4 331	5 689	6 363	5 859	4 621	1 592
18 years and over	7 667	4 812	5 700	4 106	5 402	5 996	5 558	4 380	1 497
21 years and over	7 107	4 477	5 317	3 819	5 034	5 548	5 158	4 071	1 385
60 years and over	964	822	1 077	691	1 138	1 182	1 432	968	299
62 years and over	804	697	919	586	1 027	1 029	1 280	867	257
Median	29.0	30.1	33 0	30.9	29.3	29.8	31.8	29 7	28 5
Female	**5 571**	**3 596**	**4 000**	**2 932**	**3 979**	**4 429**	**4 006**	**3 267**	**1 122**
Under 5 years	384	246	245	194	327	311	242	246	103
5 to 9 years	458	258	266	198	346	388	310	261	89
10 to 14 years	492	314	259	248	352	364	287	285	99
15 to 19 years	461	326	340	243	345	433	335	288	116
20 to 24 years	471	293	330	247	307	348	300	246	96
25 to 34 years	1 144	618	610	466	636	692	537	509	170
35 to 44 years	824	489	528	402	507	551	441	395	140
45 to 54 years	586	422	567	393	377	462	453	309	116
55 to 64 years	407	296	438	267	330	395	428	293	89
65 to 74 years	239	210	277	183	305	315	392	254	59
75 years and over	105	124	140	91	147	170	281	181	45
3 and 4 years	132	95	87	85	150	139	98	94	35
16 years and over	4 158	2 701	3 173	2 239	2 873	3 265	3 102	2 402	807
18 years and over	3 967	2 560	3 019	2 137	2 726	3 096	2 962	2 299	757
21 years and over	3 682	2 391	2 827	2 005	2 551	2 864	2 774	2 148	694
60 years and over	519	468	590	384	604	674	870	577	152
62 years and over	434	399	511	326	542	597	791	520	129
Median	29.3	30.8	33.9	32.0	30 0	30.7	34 B	30 9	28 6
HOUSEHOLD TYPE AND RELATIONSHIP									
Total persons	**11 083**	**6 917**	**7 747**	**5 733**	**7 952**	**8 753**	**7 711**	**6 391**	**2 214**
In households	11 083	6 690	7 695	5 717	7 952	8 744	7 534	6 259	2 214
Householder	3 666	2 256	2 770	2 018	2 601	2 921	2 748	2 164	727
Family householder	3 163	1 888	2 262	1 670	2 235	2 436	2 129	1 784	625
Nonfamily householder	503	368	508	348	366	485	619	380	102
Living alone	423	319	455	326	359	466	602	363	95
Spouse	2 809	1 591	1 932	1 411	1 971	2 124	1 743	1 513	555
Other relatives	4 445	2 726	2 870	2 226	3 332	3 615	2 978	2 531	909
Nonrelatives	163	117	123	62	48	84	65	51	23
Inmate of institution	-	118	52	-	-	7	133	65	-
Other, in group quarters	-	109	-	16	-	2	44	67	-
Persons per household	3.02	2.97	2.78	2.83	3.06	2 99	2.74	2 89	3 05
Persons per family	3.29	3.29	3.12	3.18	3.37	3.36	3.22	3 27	3 34
Persons 65 years and over	**620**	**566**	**726**	**472**	**849**	**831**	**1 082**	**718**	**205**
In households	620	491	724	470	849	831	961	642	205
Householder	369	275	418	319	559	563	677	443	131
Nonfamily householder	118	92	118	135	187	217	312	168	38
Living alone	115	84	112	133	186	211	309	165	38
Spouse	137	116	184	106	221	170	202	145	53
Other relatives	111	91	120	44	67	92	78	50	20
Nonrelatives	3	9	2	1	2	6	4	4	1
Inmate of institution	-	30	2	-	-	-	116	54	-
Other, in group quarters	-	45	-	2	-	-	5	22	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN									
Families	**3 163**	**1 888**	**2 262**	**1 670**	**2 235**	**2 436**	**2 129**	**1 784**	**625**
With own children under 18 years	1 765	1 023	1 042	846	1 249	1 350	1 020	976	333
Number of own children under 18 years	3 147	1 826	1 846	1 465	2 318	2 466	1 850	1 813	644
Married-couple families	**2 809**	**1 591**	**1 932**	**1 411**	**1 971**	**2 124**	**1 743**	**1 513**	**555**
With own children under 18 years	1 549	841	871	712	1 124	1 214	849	851	299
Number of own children under 18 years	2 814	1 539	1 567	1 252	2 105	2 221	1 549	1 584	585
Female householder, no husband present	**296**	**244**	**274**	**211**	**199**	**247**	**315**	**215**	**55**
With own children under 18 years	188	158	150	116	100	110	143	99	28
Number of own children under 18 years	290	256	249	184	171	206	263	186	52
MARITAL STATUS									
Male, 15 years and over	**4 064**	**2 454**	**2 884**	**2 135**	**2 918**	**3 192**	**2 835**	**2 284**	**804**
Single	901	561	644	480	654	723	699	503	150
Now married, except separated	2 894	1 657	1 980	1 455	2 029	2 196	1 826	1 570	566
Separated	27	20	24	16	28	30	41	19	10
Widowed	53	72	55	46	65	61	89	57	21
Divorced	189	144	181	138	142	182	180	135	57
Female, 15 years and over	**4 237**	**2 778**	**3 230**	**2 292**	**2 954**	**3 366**	**3 167**	**2 475**	**831**
Single	693	530	581	347	430	538	488	362	126
Now married, except separated	2 877	1 635	1 987	1 447	2 034	2 188	1 826	1 576	572
Separated	43	38	38	22	29	27	55	30	4
Widowed	289	313	314	269	335	409	564	370	67
Divorced	335	262	310	207	126	204	234	137	62

Table P-1. **General Characteristics of Persons: 1980**—Con.

[For meaning of symbols, see introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Remainder of Hamilton County, Tenn.—Con.		Totals for split tracts in Hamilton County, Tenn.										
	Tract 0120	Tract 0121•	Tract 0018	Tract 0033	Tract 0104.01	Tract 0104.02	Tract 0104.03	Tract 0105.01	Tract 0105.02	Tract 0107	Tract 0109	Tract 0113.01	Tract 0113.02
AGE													
Total persons	**1 886**	**519**	**4 188**	**6 629**	**12 026**	**7 421**	**14 807**	**7 163**	**2 826**	**2 675**	**5 792**	**12 098**	**6 783**
Under 5 years	89	38	296	473	1 073	498	1 052	427	174	146	362	963	499
5 to 9 years	119	31	296	456	1 273	524	1 191	544	162	145	315	1 071	558
10 to 14 years	150	39	259	459	1 157	583	1 372	608	160	131	334	1 049	532
15 to 19 years	138	45	326	511	994	684	1 401	622	197	160	520	1 002	557
20 to 24 years	98	68	449	589	760	631	1 103	619	307	312	741	815	499
25 to 34 years	214	93	638	1 110	2 756	1 320	2 712	1 192	517	489	1 263	2 393	1 185
35 to 44 years	254	57	357	631	1 878	1 040	2 299	961	273	224	624	1 659	913
45 to 54 years	227	62	423	829	1 046	990	1 877	1 061	358	227	556	1 130	849
55 to 64 years	234	35	467	779	575	597	1 117	733	342	348	536	778	635
65 to 74 years	195	29	406	516	348	360	465	276	225	304	354	523	344
75 years and over	168	22	271	276	166	194	218	120	111	189	187	715	212
3 and 4 years	37	14	106	148	452	191	431	191	73	52	139	380	207
16 years and over	1 497	401	3 256	5 141	8 309	5 678	10 887	5 450	2 295	2 224	4 673	8 790	5 075
18 years and over	1 433	384	3 127	4 909	7 847	5 388	10 280	5 178	2 207	2 168	4 436	8 383	4 836
21 years and over	1 366	354	2 910	4 623	7 388	5 013	9 580	4 820	2 088	2 056	4 160	7 852	4 542
60 years and over	489	67	912	1 134	761	806	1 095	693	470	646	764	1 563	817
62 years and over	436	58	792	989	645	704	909	558	413	588	663	1 405	702
Median	39.5	28.6	30.9	31.8	28.4	30.8	29.9	31.3	32.5	33.7	29.0	30.4	31.6
Female	**1 017**	**260**	**2 214**	**3 521**	**6 021**	**3 730**	**7 509**	**3 678**	**1 448**	**1 470**	**2 922**	**6 113**	**3 457**
Under 5 years	40	20	142	213	511	235	506	229	81	76	186	477	231
5 to 9 years	52	11	137	222	613	239	584	269	73	72	152	528	274
10 to 14 years	75	20	105	214	567	280	687	289	76	49	148	517	267
15 to 19 years	63	24	175	259	476	335	683	294	90	83	187	459	283
20 to 24 years	51	36	233	311	416	317	566	321	164	173	404	394	252
25 to 34 years	116	44	302	567	1 450	650	1 393	616	257	261	622	1 189	606
35 to 44 years	136	27	194	347	889	555	1 189	507	142	104	299	799	477
45 to 54 years	118	35	237	470	511	475	917	549	193	131	272	550	427
55 to 64 years	131	17	260	433	283	309	570	384	177	212	295	379	325
65 to 74 years	115	16	245	301	203	213	264	142	125	183	234	302	194
75 years and over	120	10	184	184	102	122	150	78	70	126	123	519	121
3 and 4 years	21	8	49	71	219	91	205	109	34	31	65	185	95
16 years and over	835	201	1 779	2 821	4 232	2 901	5 574	2 829	1 201	1 253	2 390	4 493	2 626
18 years and over	808	194	1 708	2 717	4 013	2 765	5 280	2 704	1 164	1 237	2 316	4 303	2 506
21 years and over	777	179	1 607	2 555	3 791	2 582	4 948	2 528	1 103	1 170	2 191	4 064	2 358
60 years and over	314	37	562	679	416	467	615	373	272	395	483	982	450
62 years and over	283	32	502	595	360	417	525	303	240	363	418	906	387
Median	43.2	28.4	35.8	34.3	28.6	31.8	30.5	32.0	33.8	36.9	29.9	31.2	32.2
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	**1 886**	**519**	**4 188**	**6 629**	**12 026**	**7 421**	**14 807**	**7 163**	**2 826**	**2 675**	**5 792**	**12 098**	**6 783**
In households	1 881	519	4 188	6 629	12 026	7 421	14 701	7 161	2 796	2 672	5 275	10 894	6 749
Householder	750	198	1 597	2 459	3 801	2 681	5 077	2 508	1 147	1 224	2 367	3 423	2 256
Family householder	526	148	1 131	1 884	3 399	2 163	4 231	2 121	837	784	1 446	3 077	2 008
Nonfamily householder	224	50	466	575	402	518	846	387	310	440	921	346	248
Living alone	201	43	414	532	364	447	737	344	267	391	792	314	224
Spouse	467	108	836	1 507	3 130	1 904	3 703	1 868	718	637	1 177	2 754	1 811
Other relatives	625	191	1 633	2 543	4 992	2 711	5 722	2 695	875	734	1 547	4 623	2 626
Nonrelatives	39	22	122	120	103	125	199	90	56	77	184	94	56
Inmate of institution	-	-	-	-	-	-	100	-	30	-	347	1 201	30
Other, in group quarters	5	-	-	-	-	-	6	2	-	3	170	3	4
Persons per household	2.51	2.62	2.62	2.70	3.16	2.77	2.90	2.86	2.44	2.18	2.23	3.18	2.99
Persons per family	3.08	3.02	3.18	3.15	3.39	3.13	3.23	3.15	2.90	2.75	2.88	3.40	3.21
Persons 65 years and over	**363**	**51**	**677**	**792**	**514**	**554**	**683**	**396**	**336**	**493**	**541**	**1 238**	**556**
In households	363	51	677	792	514	554	680	395	336	493	503	500	537
Householder	267	38	460	524	298	352	411	240	215	332	352	307	309
Nonfamily householder	136	14	213	217	116	151	158	67	78	148	172	100	91
Living alone	125	14	204	212	114	145	156	67	78	143	167	100	89
Spouse	70	10	123	178	124	127	151	94	94	118	97	106	138
Other relatives	20	3	85	87	87	66	112	60	27	43	52	81	87
Nonrelatives	6	-	9	3	5	9	6	1	-	-	2	6	3
Inmate of institution	-	-	-	-	-	-	-	-	-	-	38	738	19
Other, in group quarters	-	-	-	-	-	-	3	1	-	-	-	-	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	**526**	**148**	**1 131**	**1 884**	**3 399**	**2 163**	**4 231**	**2 121**	**837**	**784**	**1 446**	**3 077**	**2 008**
With own children under 18 years	238	68	461	823	2 214	1 133	2 400	1 061	354	300	604	1 883	1 048
Number of own children under 18 years	436	109	905	1 525	3 961	1 925	4 230	1 858	592	467	1 027	3 496	1 826
Married-couple families	**467**	**108**	**836**	**1 507**	**3 130**	**1 904**	**3 703**	**1 868**	**718**	**637**	**1 177**	**2 754**	**1 811**
With own children under 18 years	213	49	336	623	2 048	991	2 068	910	284	232	463	1 707	946
Number of own children under 18 years	394	78	673	1 199	3 695	1 698	3 710	1 616	493	376	808	3 176	1 676
Female householder, no husband present	**50**	**27**	**239**	**320**	**213**	**205**	**431**	**212**	**96**	**127**	**217**	**244**	**169**
With own children under 18 years	22	14	105	182	132	117	284	130	59	64	120	140	91
Number of own children under 18 years	38	22	199	293	209	191	448	211	83	85	189	258	136
MARITAL STATUS													
Male, 15 years and over	**678**	**202**	**1 507**	**2 369**	**4 193**	**2 840**	**5 460**	**2 693**	**1 112**	**980**	**2 345**	**4 424**	**2 509**
Single	156	51	414	581	790	662	1 260	630	288	204	750	1 020	487
Now married, except separated	477	117	875	1 545	3 185	1 955	3 796	1 905	732	652	1 243	2 905	1 861
Separated	3	-	26	24	30	22	42	22	15	13	37	89	12
Widowed	13	9	62	44	33	48	42	22	17	23	44	160	39
Divorced	29	25	130	175	155	153	320	114	60	88	271	250	110
Female, 15 years and over	**850**	**209**	**1 830**	**2 872**	**4 330**	**2 976**	**5 732**	**2 891**	**1 218**	**1 273**	**2 436**	**4 591**	**2 685**
Single	142	35	398	557	625	481	1 024	480	231	236	497	688	389
Now married, except separated	474	117	888	1 549	3 178	1 949	3 773	1 915	731	661	1 234	2 896	1 863
Separated	9	3	41	44	27	34	54	22	11	16	45	65	24
Widowed	184	24	336	415	268	282	387	217	130	215	318	681	223
Divorced	41	30	167	307	232	230	494	257	115	145	342	261	186

Table P-1. **General Characteristics of Persons: 1980**—Con.

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts

Census Tracts	Remainder of Hamilton County, Tenn.—Con.											
	Tract 0104.01*	Tract 0104.02*	Tract 0104.03*	Tract 0105.01*	Tract 0109*	Tract 0110	Tract 0111	Tract 0112	Tract 0113.01*	Tract 0113.02*	Tract 0114.01*	Tract 0114.03*
AGE												
Total persons	**1 657**	**1 864**	**20**	**2**	**193**	**5 376**	**5 339**	**10 620**	**10 230**	**1 336**	**7 668**	–
Under 5 years	163	110	2	...	10	418	338	631	918	138	582	–
5 to 9 years	169	132	–	...	9	426	411	730	1 003	138	689	–
10 to 14 years	115	166	–	...	13	475	467	796	960	128	750	–
15 to 19 years	113	162	–	...	18	476	482	1 429	880	87	752	–
20 to 24 years	117	131	1	...	10	382	209	1 598	696	65	545	–
25 to 34 years	442	286	4	...	36	919	698	1 454	2 174	325	1 580	–
35 to 44 years	267	246	5	...	32	756	819	1 286	1 483	192	1 173	–
45 to 54 years	117	225	4	...	28	582	712	1 020	972	114	783	–
55 to 64 years	76	206	2	...	26	495	572	821	594	74	446	–
65 to 74 years	56	138	2	...	7	290	356	524	306	44	253	–
75 years and over	22	62	–	...	4	157	275	331	244	31	115	–
3 and 4 years	69	49	1	...	4	165	151	255	357	57	226	–
16 years and over	1 186	1 414	18	...	158	3 955	4 012	8 298	7 147	917	5 496	–
18 years and over	1 131	1 351	18	...	147	3 747	3 775	7 938	6 780	870	5 168	–
21 years and over	1 084	1 265	18	...	140	3 505	3 596	6 577	6 333	835	4 771	–
60 years and over	114	295	3	...	25	686	891	1 192	790	107	553	–
62 years and over	94	258	3	...	17	570	781	1 036	670	90	465	–
Median	29.8	33.1	39.0	...	35.5	30.9	35.8	25.7	28.6	29.7	28.5	–
Female	**834**	**931**	**8**	...	**97**	**2 663**	**2 786**	**5 544**	**5 138**	**661**	**3 802**	–
Under 5 years	80	53	–	...	5	200	163	286	455	61	267	–
5 to 9 years	77	58	–	...	5	193	207	385	487	63	332	–
10 to 14 years	69	75	–	...	3	214	229	411	469	64	364	–
15 to 19 years	63	73	–	...	10	235	250	766	425	41	332	–
20 to 24 years	67	67	–	...	6	187	108	821	358	31	287	–
25 to 34 years	225	148	2	...	17	464	385	753	1 104	167	831	–
35 to 44 years	116	125	2	...	16	375	427	645	718	98	600	–
45 to 54 years	54	105	2	...	12	293	373	546	483	54	362	–
55 to 64 years	39	115	1	...	14	255	272	444	296	36	216	–
65 to 74 years	31	79	1	...	5	157	196	282	173	24	149	–
75 years and over	13	33	–	...	4	90	176	205	170	22	62	–
3 and 4 years	34	23	–	...	–	82	79	124	172	27	93	–
16 years and over	593	725	8	...	81	2 018	2 131	4 374	3 635	466	2 781	–
18 years and over	565	696	8	...	75	1 912	2 000	4 192	3 462	447	2 633	–
21 years and over	541	658	8	...	72	1 788	1 918	3 453	3 240	428	2 439	–
60 years and over	61	161	2	...	15	372	500	677	459	62	305	–
62 years and over	50	139	2	...	11	310	445	592	406	52	260	–
Median	29.0	34.5	42.5	...	37.8	31.7	36.2	26.2	29.0	29.8	29.0	–
HOUSEHOLD TYPE AND RELATIONSHIP												
Total persons	**1 657**	**1 864**	**20**	**2**	**193**	**5 376**	**5 339**	**10 620**	**10 230**	**1 336**	**7 668**	–
In households	1 657	1 864	20	...	193	5 376	5 183	9 402	10 067	1 302	7 668	–
Householder	591	677	8	...	79	1 800	1 755	3 217	3 141	405	2 444	–
Family householder	465	559	7	...	60	1 537	1 532	2 697	2 840	374	2 149	–
Nonfamily householder	126	118	1	...	19	263	223	520	301	31	295	–
Living alone	110	112	–	...	15	235	209	463	273	21	263	–
Spouse	445	489	7	...	51	1 379	1 400	2 405	2 562	349	1 936	–
Other relatives	595	686	4	...	59	2 138	1 991	3 648	4 279	534	3 216	–
Nonrelatives	26	12	1	...	4	59	37	132	85	14	72	–
Inmate of institution	–	–	–	...	–	–	140	7	160	30	–	–
Other, in group quarters	–	–	–	...	–	–	16	1 211	3	4	–	–
Persons per household	2.80	2.75	2.50	...	2.44	2.99	2.95	2.92	3.21	3.21	3.14	–
Persons per family	3.24	3.10	2.57	...	2.83	3.29	3.21	3.24	3.41	3.36	3.40	–
Persons 65 years and over	**78**	**200**	**2**	...	**11**	**447**	**631**	**855**	**550**	**75**	**368**	–
In households	78	200	2	...	11	447	487	851	421	56	368	–
Householder	49	134	1	...	7	289	311	520	249	30	217	–
Nonfamily householder	23	49	–	...	3	100	112	182	81	13	77	–
Living alone	23	48	–	...	3	90	107	175	81	11	74	–
Spouse	15	54	1	...	1	102	127	207	89	14	76	–
Other relatives	13	11	–	...	3	50	45	112	77	12	74	–
Nonrelatives	1	1	–	...	–	6	4	12	6	–	1	–
Inmate of institution	–	–	–	...	–	–	134	4	129	19	–	–
Other, in group quarters	–	–	–	...	–	–	10	–	–	–	–	–
FAMILY TYPE BY PRESENCE OF OWN CHILDREN												
Families	**465**	**559**	**7**	...	**60**	**1 537**	**1 532**	**2 697**	**2 840**	**374**	**2 149**	–
With own children under 18 years	287	269	1	...	22	814	830	1 375	1 767	237	1 305	–
Number of own children under 18 years	501	479	2	...	39	1 518	1 519	2 502	3 281	443	2 302	–
Married-couple families	**445**	**489**	**7**	...	**51**	**1 379**	**1 400**	**2 405**	**2 562**	**349**	**1 936**	–
With own children under 18 years	272	235	1	...	18	737	753	1 231	1 608	220	1 177	–
Number of own children under 18 years	482	420	2	...	33	1 382	1 387	2 266	2 993	415	2 111	–
Female householder, no husband present	**14**	**54**	–	...	**8**	**122**	**109**	**250**	**212**	**22**	**172**	–
With own children under 18 years	9	27	–	...	3	67	63	133	129	16	109	–
Number of own children under 18 years	10	48	–	...	5	120	110	222	240	26	161	–
MARITAL STATUS												
Male, 15 years and over	**602**	**711**	**10**	...	**77**	**2 001**	**1 936**	**4 001**	**3 622**	**459**	**2 808**	–
Single	100	144	1	...	19	433	404	1 355	764	80	642	–
Now married, except separated	458	507	7	...	52	1 421	1 431	2 472	2 614	357	1 998	–
Separated	8	4	–	...	–	12	4	28	34	1	16	–
Widowed	5	19	–	...	1	29	57	45	52	8	35	–
Divorced	31	37	2	...	5	106	40	101	158	13	117	–
Female, 15 years and over	**608**	**745**	**8**	...	**84**	**2 056**	**2 187**	**4 462**	**3 727**	**473**	**2 839**	–
Single	89	96	–	...	15	308	378	1 350	546	53	442	–
Now married, except separated	451	505	7	...	52	1 417	1 425	2 480	2 619	355	1 986	–
Separated	8	12	–	...	1	25	11	29	41	5	31	–
Widowed	29	80	–	...	10	204	264	369	319	34	180	–
Divorced	31	52	1	...	6	102	109	234	202	26	200	–

Table P-1. General Characteristics of Persons: 1980—Con.

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Red Bank city, Hamilton County, Tenn.							Remainder of Hamilton County, Tenn.					
	Tract 0104.02*	Tract 0105.01*	Tract 0105.02*	Tract 0106	Tract 0107*	Tract 0108	Tract 0109*	Tract 0018*	Tract 0033*	Tract 0101	Tract 0102	Tract 0103.01	Tract 0103.02
AGE													
Total persons	153	1 763	440	3 326	2 647	4 789	179	121	417	6 887	4 522	6 897	6 668
Under 5 years	5	75	36	171	145	307	–	3	18	486	290	654	459
5 to 9 years	4	144	35	188	144	290	1	8	20	601	391	682	550
10 to 14 years	10	204	23	166	127	298	21	8	34	649	404	618	519
15 to 19 years	17	209	26	252	159	343	151	7	27	569	373	595	582
20 to 24 years	12	111	109	357	310	623	–	16	16	497	319	554	547
25 to 34 years	12	209	129	534	485	1 019	–	20	50	1 301	695	1 346	1 033
35 to 44 years	17	334	55	363	221	528	3	16	55	907	635	945	810
45 to 54 years	46	290	16	357	222	376	–	14	59	702	489	637	734
55 to 64 years	11	127	8	439	342	403	1	13	54	595	451	473	664
65 to 74 years	16	36	1	324	303	400	2	9	54	382	335	281	516
75 years and over	3	24	2	175	189	202	–	7	30	198	140	112	254
3 and 4 years	2	35	16	64	52	120	–	1	7	209	119	244	188
16 years and over	128	1 294	340	2 761	2 202	3 839	128	101	340	5 030	3 356	4 828	5 013
18 years and over	123	1 196	335	2 660	2 146	3 720	33	97	326	4 784	3 218	4 579	4 753
21 years and over	115	1 104	306	2 474	2 035	3 462	6	88	315	4 504	2 996	4 261	4 452
60 years and over	24	111	5	695	642	810	3	25	109	848	689	588	1 057
62 years and over	21	85	5	611	585	734	3	22	99	750	601	505	938
Median	44.8	32.7	24.6	34.8	33.6	29.3	16.7	33.8	43.4	30.2	32.1	27.5	31.6
Female	88	877	211	1 752	1 455	2 524	4	58	225	3 479	2 284	3 333	3 440
Under 5 years	5	43	16	71	76	156	–	1	4	208	160	298	212
5 to 9 years	3	75	17	89	71	143	1	2	9	322	190	309	260
10 to 14 years	5	89	10	78	46	139	–	6	23	321	190	281	261
15 to 19 years	12	88	18	124	83	186	1	4	14	279	165	280	288
20 to 24 years	7	54	61	197	173	343	–	8	9	271	157	291	263
25 to 34 years	7	114	55	260	259	497	–	8	30	655	352	670	532
35 to 44 years	11	176	25	191	102	256	1	7	28	426	328	453	406
45 to 54 years	22	139	5	188	127	199	–	8	31	379	243	307	380
55 to 64 years	5	64	4	262	210	224	–	6	33	297	237	233	357
65 to 74 years	8	17	–	175	182	254	1	3	27	204	185	142	319
75 years and over	3	18	–	117	126	127	–	5	17	117	77	69	162
3 and 4 years	2	24	8	20	31	57	–	–	2	103	62	110	95
16 years and over	70	648	164	1 501	1 242	2 058	3	49	187	2 567	1 703	2 392	2 640
18 years and over	66	606	162	1 445	1 226	1 995	3	47	178	2 450	1 650	2 273	2 521
21 years and over	61	571	140	1 344	1 159	1 853	2	41	172	2 300	1 547	2 117	2 369
60 years and over	15	59	2	412	393	499	1	10	60	456	378	311	634
62 years and over	13	46	2	365	361	454	1	10	52	410	335	274	571
Median	40.0	33.3	23.7	38.3	36.8	29.9	29.0	33.5	43.8	30.6	32.7	27.9	33.1
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	153	1 763	440	3 326	2 647	4 789	179	121	417	6 887	4 522	6 897	6 668
In households	153	1 763	440	3 326	2 644	4 789	9	121	417	6 880	4 522	6 897	6 668
Householder	59	543	214	1 429	1 212	2 150	4	46	163	2 263	1 532	2 224	2 371
Family householder	48	499	103	999	777	1 328	2	31	128	2 019	1 297	1 912	1 953
Nonfamily householder	11	44	111	430	435	822	2	15	35	244	235	312	418
Living alone	11	41	82	384	387	728	2	11	34	224	223	286	397
Spouse	44	457	67	833	631	1 094	2	29	114	1 833	1 144	1 704	1 639
Other relatives	50	757	126	994	725	1 405	3	41	135	2 733	1 803	2 901	2 607
Nonrelatives	–	6	33	70	76	140	–	5	5	51	43	68	51
Inmate of institution	–	–	–	–	–	–	–	–	–	–	–	–	–
Other, in group quarters	–	–	–	–	3	–	170	–	–	7	–	–	–
Persons per household	2.59	3.25	2.06	2.33	2.18	2.23	2.25	2.63	2.56	3.04	2.95	3.10	2.81
Persons per family	2.96	3.43	2.87	2.83	2.75	2.88	3.50	3.26	2.95	3.26	3.27	3.41	3.17
Persons 65 years and over	19	60	3	499	492	602	2	16	84	580	475	393	770
In households	19	60	3	499	492	602	2	16	84	580	475	393	770
Householder	13	29	3	331	331	420	2	11	53	356	318	249	515
Nonfamily householder	4	6	3	119	147	197	1	4	19	111	111	94	206
Living alone	4	6	3	116	142	197	1	2	19	111	108	90	201
Spouse	6	11	–	121	118	138	–	3	22	142	110	84	178
Other relatives	–	20	–	44	43	42	–	2	9	80	44	55	74
Nonrelatives	–	–	–	3	–	2	–	–	–	2	3	5	3
Inmate of institution	–	–	–	–	–	–	–	–	–	–	–	–	–
Other, in group quarters	–	–	–	–	–	–	–	–	–	–	–	–	–
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	48	499	108	999	777	1 328	...	31	128	2 019	1 297	1 912	1 953
With own children under 18 years	21	307	70	357	297	588	...	9	47	1 067	632	1 141	969
Number of own children under 18 years	27	553	102	605	461	976	2	23	83	1 941	1 180	2 122	1 714
Married-couple families	44	457	67	833	631	1 094	...	29	114	1 833	1 144	1 704	1 639
With own children under 18 years	18	275	37	281	230	474	...	9	44	977	569	1 031	829
Number of own children under 18 years	24	499	53	485	371	804	2	23	78	1 779	1 074	1 927	1 481
Female householder, no husband present	4	33	27	142	126	201	...	1	10	147	118	145	267
With own children under 18 years	3	28	26	68	63	109	...	–	2	72	49	82	125
Number of own children under 18 years	3	46	38	111	84	165	–	–	4	126	82	149	209
MARITAL STATUS													
Male, 15 years and over	59	670	178	1 287	969	1 808	154	53	156	2 523	1 693	2 498	2 433
Single	10	182	65	299	200	453	151	13	25	491	372	495	541
Now married, except separated	46	463	73	850	646	1 126	3	30	119	1 883	1 174	1 778	1 689
Separated	1	1	9	9	13	23	–	–	–	13	13	22	23
Widowed	–	6	3	21	22	42	–	3	8	33	36	43	53
Divorced	2	18	28	108	88	164	–	7	4	103	98	160	127
Female, 15 years and over	75	670	168	1 514	1 262	2 086	3	49	189	2 628	1 744	2 445	2 707
Single	18	119	61	291	236	388	1	14	32	361	262	317	393
Now married, except separated	46	462	72	852	655	1 118	2	30	118	1 884	1 175	1 760	1 685
Separated	1	4	4	16	16	17	–	1	1	18	19	23	28
Widowed	7	40	5	195	213	289	–	2	31	255	194	189	363
Divorced	3	45	26	160	142	274	–	2	7	110	94	156	238

Table P-1. General Characteristics of Persons: 1980—Con.

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Chattanooga city, Hamilton County, Tenn.—Con.						East Ridge city, Hamilton County, Tenn					Middle Valley (CDP), Hamilton County, Tenn	
	Tract 0114.01*	Tract 0114.02	Tract 0114.03*	Tract 0114.04*	Tract 0115	Tract 0121*	Tract 0114.04*	Tract 0116	Tract 0117	Tract 0118	Tract 0119	Tract 0104.01*	Tract 0104.03*
AGE													
Total persons	**3 415**	**5 739**	**6 917**	**6 205**	**2 156**	**5 214**	**1 542**	**6 101**	**4 524**	**7 187**	**1 882**	**10 369**	**1 051**
Under 5 years	221	366	497	388	134	365	99	362	182	314	106	910	122
5 to 9 years	275	424	558	423	167	378	122	398	223	395	88	1 104	108
10 to 14 years	265	484	630	469	154	455	132	421	265	522	92	1 042	97
15 to 19 years	272	572	636	509	172	466	162	423	367	654	116	881	78
20 to 24 years	325	542	556	495	176	415	139	569	400	617	238	643	60
25 to 34 years	577	889	1 178	959	322	819	231	1 005	736	964	432	2 314	239
35 to 44 years	431	755	893	735	197	710	245	673	473	918	164	1 611	176
45 to 54 years	407	815	830	858	233	689	215	717	545	1 026	215	929	90
55 to 64 years	390	520	573	733	283	496	107	735	668	943	227	499	49
65 to 74 years	176	273	361	434	164	291	60	455	454	582	142	292	17
75 years and over	76	99	205	202	154	130	30	343	211	252	62	144	15
3 and 4 years	69	136	185	140	52	139	40	143	73	124	38	383	56
16 years and over	2 594	4 356	5 094	4 840	1 664	3 930	1 150	4 846	3 786	5 831	1 577	7 123	711
18 years and over	2 499	4 093	4 812	4 617	1 594	3 722	1 083	4 679	3 637	5 551	1 529	6 716	675
21 years and over	2 336	3 773	4 477	4 308	1 503	3 465	1 009	4 407	3 412	5 170	1 446	6 304	636
60 years and over	411	588	822	955	450	624	122	1 136	969	1 261	313	647	55
62 years and over	339	487	697	814	391	528	105	1 006	831	1 058	265	551	43
Median	30.4	30.3	30.1	33.5	33.4	31.2	30.5	33.3	37.0	36.8	30.8	28.2	27.8
Female	**1 769**	**2 972**	**3 596**	**3 207**	**1 127**	**2 672**	**793**	**3 252**	**2 484**	**3 832**	**1 021**	**5 187**	**520**
Under 5 years	117	186	246	191	64	174	54	178	93	139	53	431	52
5 to 9 years	126	213	258	200	89	187	66	193	121	207	48	536	52
10 to 14 years	128	239	314	202	79	228	57	209	130	252	47	498	50
15 to 19 years	129	266	326	265	77	219	75	200	183	304	55	413	42
20 to 24 years	184	278	293	256	81	211	74	306	221	319	136	349	27
25 to 34 years	313	470	618	492	162	422	118	498	377	521	221	1 225	127
35 to 44 years	224	420	489	393	101	375	135	357	263	511	84	773	83
45 to 54 years	224	419	422	459	124	358	108	406	309	551	130	457	45
55 to 64 years	191	269	296	385	145	250	53	397	371	520	129	244	22
65 to 74 years	90	144	210	243	88	167	34	253	274	337	80	172	11
75 years and over	43	68	124	121	117	81	19	255	142	171	38	89	9
3 and 4 years	39	66	95	70	26	77	17	69	41	54	19	185	21
16 years and over	1 377	2 280	2 701	2 574	882	2 038	599	2 644	2 107	3 174	862	3 639	358
18 years and over	1 334	2 169	2 560	2 460	847	1 943	559	2 564	2 024	3 043	843	3 448	338
21 years and over	1 243	1 999	2 391	2 297	805	1 826	530	2 424	1 910	2 861	799	3 250	322
60 years and over	214	324	468	521	275	347	69	689	578	732	173	355	29
62 years and over	174	274	399	452	243	294	59	621	499	634	149	310	25
Median	30.2	31.3	30.8	34.9	36.7	32.4	31.2	35.9	39.4	38.7	31.7	28.5	27.9
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	**3 415**	**5 739**	**6 917**	**6 205**	**2 156**	**5 214**	**1 542**	**6 101**	**4 524**	**7 187**	**1 882**	**10 369**	**1 051**
In households	3 415	5 739	6 690	6 153	2 071	5 198	1 542	5 946	4 524	7 185	1 882	10 369	1 051
Householder	1 222	1 891	2 256	2 270	732	1 820	500	2 379	1 881	2 772	845	3 210	317
Family householder	1 014	1 653	1 888	1 808	582	1 522	454	1 795	1 364	2 229	569	2 934	295
Nonfamily householder	208	238	368	462	150	298	46	584	517	543	276	276	22
Living alone	160	207	319	415	138	283	40	539	461	493	236	254	17
Spouse	873	1 400	1 591	1 542	469	1 303	390	1 503	1 110	1 868	483	2 685	273
Other relatives	1 229	2 364	2 726	2 244	844	2 035	626	1 964	1 424	2 435	499	4 397	451
Nonrelatives	91	84	117	97	26	40	26	100	109	110	55	77	10
Inmate of institution	-	-	118	52	81	-	-	122	-	-	-	-	-
Other, in group quarters	-	-	109	-	4	16	-	33	-	2	-	-	-
Persons per household	2.79	3.03	2.97	2.71	2.83	2.86	3.08	2.50	2.41	2.59	2.23	3.23	3.32
Persons per family	3.07	3.28	3.29	3.09	3.26	3.19	3.24	2.93	2.86	2.93	2.73	3.41	3.45
Persons 65 years and over	**252**	**372**	**566**	**636**	**318**	**421**	**90**	**798**	**665**	**834**	**204**	**436**	**32**
In households	252	372	491	634	238	419	90	681	665	834	204	436	32
Householder	152	212	275	370	151	281	48	455	408	531	140	249	19
Nonfamily householder	41	59	92	108	51	121	10	195	153	214	54	93	7
Living alone	41	54	84	102	48	119	10	188	152	207	52	91	7
Spouse	61	85	116	160	52	96	24	156	153	195	49	109	7
Other relatives	37	73	91	102	31	41	18	67	101	101	13	74	6
Nonrelatives	2	2	9	2	4	1	-	3	3	7	2	4	-
Inmate of institution	-	-	30	2	80	-	-	112	-	-	-	-	-
Other, in group quarters	-	-	45	-	-	2	-	5	-	-	-	-	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	**1 014**	**1 653**	**1 888**	**1 808**	**582**	**1 522**	**454**	**1 795**	**1 364**	**2 229**	**569**	**2 934**	**295**
With own children under 18 years	460	855	1 023	789	263	778	253	781	493	937	206	1 927	188
Number of own children under 18 years	845	1 482	1 826	1 414	489	1 356	432	1 298	811	1 539	318	3 460	358
Married-couple families	**873**	**1 400**	**1 591**	**1 542**	**469**	**1 303**	**390**	**1 503**	**1 110**	**1 868**	**483**	**2 685**	**273**
With own children under 18 years	372	702	841	659	214	663	212	633	387	735	162	1 776	179
Number of own children under 18 years	703	1 240	1 539	1 192	417	1 174	375	1 085	662	1 246	258	3 213	341
Female householder, no husband present	**124**	**210**	**244**	**218**	**86**	**184**	**56**	**237**	**214**	**321**	**75**	**199**	**16**
With own children under 18 years	79	133	158	114	40	102	36	125	101	191	41	123	8
Number of own children under 18 years	129	212	256	198	61	162	51	179	139	276	56	199	15
MARITAL STATUS													
Male, 15 years and over	**1 256**	**2 131**	**2 454**	**2 311**	**806**	**1 933**	**573**	**2 248**	**1 714**	**2 722**	**723**	**3 591**	**358**
Single	259	543	561	513	212	429	131	427	395	598	161	690	68
Now married, except separated	896	1 440	1 657	1 580	486	1 338	400	1 565	1 140	1 905	493	2 727	276
Separated	11	17	20	20	15	16	4	26	12	14	6	22	1
Widowed	18	31	72	50	33	37	5	67	39	42	7	28	2
Divorced	72	100	144	148	60	113	33	163	128	163	56	124	11
Female, 15 years and over	**1 398**	**2 334**	**2 778**	**2 614**	**895**	**2 083**	**616**	**2 672**	**2 140**	**3 234**	**873**	**3 722**	**366**
Single	251	436	530	471	120	312	110	348	413	519	157	536	53
Now married, except separated	891	1 448	1 635	1 588	497	1 330	399	1 551	1 136	1 906	497	2 727	276
Separated	12	32	38	28	18	19	10	38	17	25	11	19	4
Widowed	109	192	313	266	186	245	48	466	336	426	103	239	13
Divorced	135	226	262	261	74	177	49	269	238	358	105	201	20

Table P-1. General Characteristics of Persons: 1980—Con.

[For meaning of symbols, see introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Chattanooga city, Hamilton County, Tenn.—Con. Tract 0030	Tract 0031	Tract 0032	Tract 0033*	Tract 0034	Tract 0104.02*	Tract 0104.03*	Tract 0105.01*	Tract 0105.02*	Tract 0107*	Tract 0109*	Tract 0113.01*	Tract 0113.02*
AGE													
Total persons	**2 372**	**872**	**5 530**	**6 212**	**3 795**	**5 404**	**13 736**	**5 398**	**2 386**	**28**	**5 420**	**1 868**	**5 447**
Under 5 years	156	-	414	455	234	383	928	352	138	1	352	45	361
5 to 9 years	110	1	453	436	204	388	1 083	400	127	1	305	68	420
10 to 14 years	93	3	550	425	183	407	1 275	404	137	4	300	89	404
15 to 19 years	118	48	621	484	234	505	1 323	413	171	1	351	122	470
20 to 24 years	194	134	418	573	515	488	1 042	508	198	2	731	119	434
25 to 34 years	381	131	778	1 060	742	1 022	2 469	983	388	4	1 227	219	860
35 to 44 years	191	48	671	576	336	777	2 118	627	218	3	589	176	721
45 to 54 years	250	38	579	770	344	719	1 783	770	342	5	528	158	735
55 to 64 years	351	77	465	725	489	380	1 066	605	334	6	509	184	561
65 to 74 years	332	138	382	462	355	206	446	240	224	1	345	217	300
75 years and over	196	254	199	246	159	129	203	96	109	-	183	471	181
3 and 4 years	57	-	157	141	92	140	374	156	57	-	135	23	150
16 years and over	1 987	868	3 992	4 801	3 132	4 136	10 158	4 154	1 955	22	4 387	1 643	4 158
18 years and over	1 946	865	3 714	4 583	3 041	3 914	9 587	3 980	1 872	22	4 256	1 603	3 966
21 years and over	1 863	789	3 405	4 308	2 861	3 633	8 926	3 714	1 782	21	4 014	1 519	3 707
60 years and over	704	440	809	1 025	776	487	1 037	582	465	4	736	773	710
62 years and over	622	424	711	890	664	425	863	473	408	3	643	735	612
Median	42.4	60.6	29.0	31.3	31.4	29.9	30.2	30.9	36.6	38.0	29.5	50.9	32.4
Female	**1 350**	**381**	**3 000**	**3 296**	**2 047**	**2 711**	**6 981**	**2 800**	**1 237**	**15**	**2 821**	**975**	**2 796**
Under 5 years	78	-	180	209	100	177	454	186	65	-	181	22	170
5 to 9 years	65	1	247	213	100	178	532	194	56	1	146	41	211
10 to 14 years	47	2	266	191	106	200	637	200	66	3	145	48	203
15 to 19 years	64	-	323	245	132	250	641	206	72	-	176	34	242
20 to 24 years	108	5	229	302	274	243	539	267	103	-	398	36	221
25 to 34 years	188	5	439	537	360	495	1 264	502	202	2	605	85	439
35 to 44 years	107	2	377	319	174	419	1 104	331	117	2	282	81	379
45 to 54 years	146	7	322	439	186	348	870	409	188	4	260	67	373
55 to 64 years	209	49	257	400	291	189	547	320	173	2	281	83	289
65 to 74 years	205	104	233	274	221	126	252	125	125	1	228	129	170
75 years and over	133	206	127	167	103	86	141	60	70	-	119	349	99
3 and 4 years	29	-	64	69	40	66	184	85	26	-	65	13	68
16 years and over	1 149	378	2 246	2 634	1 720	2 106	5 208	2 180	1 037	11	2 306	858	2 160
18 years and over	1 124	378	2 110	2 539	1 670	2 003	4 934	2 097	1 002	11	2 238	841	2 059
21 years and over	1 077	378	1 933	2 383	1 569	1 863	4 618	1 956	963	11	2 117	824	1 930
60 years and over	441	345	492	619	483	291	584	314	270	2	467	523	388
62 years and over	392	334	435	543	419	265	498	257	238	2	406	500	335
Median	46.5	75.9	30.7	33.7	33.1	30.9	30.7	31.6	40.1	40.5	29.8	64.1	33.2
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	**2 372**	**872**	**5 530**	**6 212**	**3 795**	**5 404**	**13 736**	**5 398**	**2 386**	**28**	**5 420**	**1 868**	**5 447**
In households	2 372	393	5 528	6 212	3 782	5 404	13 630	5 396	2 356	28	5 073	827	5 447
Householder	1 020	349	1 789	2 296	1 766	1 945	4 752	1 964	933	12	2 284	282	1 851
Family householder	735	34	1 391	1 756	1 050	1 556	3 929	1 621	734	7	1 384	237	1 634
Nonfamily householder	285	315	398	540	716	389	823	343	199	5	900	45	217
Living alone	259	312	370	498	624	324	720	303	185	4	775	41	203
Spouse	600	25	979	1 393	801	1 371	3 423	1 410	651	6	1 124	192	1 462
Other relatives	704	15	2 661	2 408	1 070	1 975	5 267	1 938	749	9	1 485	344	2 092
Nonrelatives	48	4	99	115	145	113	188	84	23	1	180	9	42
Inmate of institution	-	414	-	-	-	-	100	-	30	-	347	1 041	-
Other, in group quarters	-	65	2	-	13	-	6	2	-	-	-	-	-
Persons per household	2.33	1.13	3.09	2.71	2.14	2.78	2.87	2.75	2.53	2.33	2.22	2.93	2.94
Persons per family	2.77	2.18	3.62	3.16	2.78	3.15	3.21	3.07	2.91	3.14	2.89	3.26	3.18
Persons 65 years and over	**528**	**392**	**581**	**708**	**514**	**335**	**649**	**336**	**333**	**1**	**528**	**688**	**481**
In households	528	305	581	708	514	335	646	335	333	1	490	79	481
Householder	341	279	383	471	369	205	391	211	212	1	343	58	279
Nonfamily householder	129	255	184	198	172	98	151	61	75	1	168	19	78
Living alone	127	253	180	193	166	93	149	61	75	1	163	19	78
Spouse	124	17	99	156	101	67	143	83	94	-	96	17	124
Other relatives	60	6	83	78	40	55	106	40	27	-	49	4	75
Nonrelatives	3	3	16	3	4	8	6	1	-	-	2	-	3
Inmate of institution	-	82	-	-	-	-	-	-	-	-	38	609	-
Other, in group quarters	-	5	-	-	-	-	3	1	-	-	-	-	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	**735**	**34**	**1 391**	**1 756**	**1 050**	**1 556**	**3 929**	**1 621**	**734**	**7**	**1 384**	**237**	**1 634**
With own children under 18 years	232	-	722	776	420	843	2 211	754	284	3	581	116	811
Number of own children under 18 years	387	-	1 507	1 442	680	1 419	3 870	1 305	490	6	986	215	1 383
Married-couple families	**600**	**25**	**979**	**1 393**	**801**	**1 371**	**3 423**	**1 410**	**651**	**6**	**1 124**	**192**	**1 462**
With own children under 18 years	195	-	493	579	273	738	1 888	635	247	2	444	99	726
Number of own children under 18 years	324	-	1 036	1 121	457	1 254	3 367	1 117	440	5	773	183	1 261
Female householder, no husband present	**119**	**6**	**366**	**310**	**224**	**147**	**415**	**179**	**69**	**1**	**209**	**32**	**147**
With own children under 18 years	35	-	212	180	137	87	276	102	33	1	117	11	75
Number of own children under 18 years	60	-	435	289	211	140	433	165	45	1	184	18	110
MARITAL STATUS													
Male, 15 years and over	**853**	**490**	**1 806**	**2 213**	**1 433**	**2 070**	**5 092**	**2 022**	**934**	**11**	**2 114**	**802**	**2 050**
Single	152	293	565	556	375	508	1 191	448	223	4	580	256	407
Now married, except separated	618	104	1 017	1 426	838	1 402	3 513	1 441	659	6	1 188	291	1 504
Separated	11	8	39	24	23	17	41	21	6	-	37	55	11
Widowed	18	41	60	36	21	29	40	16	14	1	43	108	31
Divorced	54	44	125	171	176	114	307	96	32	-	266	92	97
Female, 15 years and over	**1 160**	**378**	**2 307**	**2 683**	**1 741**	**2 156**	**5 358**	**2 220**	**1 050**	**11**	**2 349**	**864**	**2 212**
Single	181	54	607	525	333	367	971	361	170	-	481	142	336
Now married, except separated	618	34	1 026	1 431	826	1 398	3 490	1 452	659	6	1 180	277	1 508
Separated	7	14	69	43	18	21	50	18	7	-	44	24	19
Widowed	235	241	329	384	277	195	374	177	125	2	308	362	189
Divorced	119	35	276	300	287	175	473	212	89	3	336	59	160

Table P-1. **General Characteristics of Persons: 1980**—Con.

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts

Census Tracts	Tract 0016	Tract 0018[P]	Tract 0019	Tract 0020	Tract 0021	Tract 0022	Tract 0023	Tract 0024	Tract 0025	Tract 0026	Tract 0027	Tract 0028	Tract 0029
	Chattanooga city, Hamilton County, Tenn.—Con.												
AGE													
Total persons	**3 060**	**4 067**	**7 515**	**1 726**	**1 379**	**167**	**1 925**	**4 705**	**5 064**	**1 657**	**1 162**	**3 398**	**2 636**
Under 5 years	219	293	764	117	106	15	161	321	419	164	99	171	193
5 to 9 years	223	288	836	140	69	13	157	323	401	140	75	160	160
10 to 14 years	233	251	863	232	79	16	157	305	382	119	96	146	128
15 to 19 years	194	319	920	247	112	10	168	319	373	128	95	178	157
20 to 24 years	186	433	722	143	115	16	142	408	419	147	132	293	294
25 to 34 years	324	618	941	127	159	26	290	663	710	231	170	602	530
35 to 44 years	136	341	574	121	119	9	191	401	425	148	83	286	227
45 to 54 years	172	409	582	138	182	17	197	512	501	169	120	268	215
55 to 64 years	274	454	576	155	194	18	205	640	608	156	135	416	263
65 to 74 years	564	397	473	196	169	15	178	525	484	169	104	485	271
75 years and over	535	264	264	110	75	12	79	288	342	86	53	393	198
3 and 4 years	91	105	282	37	41	4	74	134	165	67	34	56	69
16 years and over	2 349	3 155	4 892	1 189	1 105	122	1 421	3 696	3 780	1 208	878	2 890	2 120
18 years and over	2 267	3 030	4 513	1 076	1 060	117	1 361	3 571	3 642	1 158	845	2 822	2 049
21 years and over	2 152	2 822	3 964	952	991	111	1 246	3 353	3 418	1 077	774	2 703	1 952
60 years and over	1 247	887	1 032	378	337	34	352	1 125	1 135	337	234	1 071	620
62 years and over	1 199	770	910	361	297	29	311	1 001	1 017	307	203	985	563
Median	46.1	30.8	22.4	24.4	40.0	29.4	31.1	35.3	31.6	30.7	29.8	40.1	31.0
Female	**2 123**	**2 156**	**4 288**	**1 006**	**677**	**76**	**1 040**	**2 503**	**2 805**	**882**	**602**	**1 849**	**1 466**
Under 5 years	112	141	357	71	57	7	81	148	225	76	52	73	95
5 to 9 years	111	135	410	69	38	3	94	157	182	75	30	67	91
10 to 14 years	113	99	472	124	40	2	83	161	181	61	42	64	60
15 to 19 years	97	171	477	121	52	5	82	150	172	54	49	85	73
20 to 24 years	117	225	420	78	61	9	76	208	218	79	64	150	161
25 to 34 years	219	294	564	79	73	12	143	331	408	114	74	284	257
35 to 44 years	99	187	392	85	49	7	88	199	217	78	42	146	124
45 to 54 years	138	229	382	95	87	4	114	285	282	85	70	145	115
55 to 64 years	209	254	368	88	82	11	124	370	358	95	74	239	161
65 to 74 years	459	242	293	118	89	9	110	310	318	108	72	317	181
75 years and over	449	179	153	78	49	7	45	184	244	57	33	279	148
3 and 4 years	42	49	132	17	25	3	38	52	90	30	18	25	34
16 years and over	1 770	1 730	2 971	717	533	63	770	2 008	2 180	660	474	1 631	1 204
18 years and over	1 733	1 661	2 774	667	511	62	740	1 953	2 119	638	453	1 601	1 172
21 years and over	1 665	1 566	2 482	598	476	57	677	1 842	2 014	604	415	1 541	1 114
60 years and over	1 022	552	623	233	182	20	214	681	743	215	147	697	422
62 years and over	983	492	547	221	166	18	185	595	678	198	134	652	386
Median	58.1	35.8	25.1	30.0	39.9	36.0	32.2	39.9	35.6	33.3	33.5	49.1	34.7
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	**3 060**	**4 067**	**7 515**	**1 726**	**1 379**	**167**	**1 925**	**4 705**	**5 064**	**1 657**	**1 162**	**3 398**	**2 636**
In households	3 060	4 067	7 430	1 720	1 343	151	1 925	4 705	5 000	1 638	1 162	3 384	2 610
Householder	1 774	1 551	2 282	617	550	55	701	1 867	2 048	583	441	1 581	1 156
Family householder	590	1 100	1 785	327	290	32	534	1 336	1 366	444	295	945	711
Nonfamily householder	1 184	451	497	290	260	23	167	531	682	139	146	636	445
Living alone	1 173	403	465	251	202	19	153	489	635	125	135	561	396
Spouse	165	807	622	87	131	15	368	1 031	904	327	208	766	561
Other relatives	1 073	1 592	4 401	938	520	76	821	1 728	1 945	701	479	927	793
Nonrelatives	48	117	125	78	142	5	35	79	103	27	34	110	100
Inmate of institution	–	–	75	–	15	16	–	–	–	–	–	–	9
Other, in group quarters	–	–	10	6	21	–	–	–	64	19	–	14	17
Persons per household	1.72	2.62	3.26	2.79	2.44	2.75	2.75	2.52	2.44	2.81	2.63	2.14	2.26
Persons per family	3.10	3.18	3.81	4.13	3.24	3.84	3.23	3.07	3.09	3.32	3.33	2.79	2.90
Persons 65 years and over	**1 099**	**661**	**737**	**306**	**244**	**27**	**257**	**813**	**826**	**255**	**157**	**878**	**469**
In households	1 099	661	691	304	244	27	257	813	826	255	157	866	468
Householder	1 010	449	498	256	171	19	183	557	614	167	113	603	336
Nonfamily householder	893	209	209	183	86	10	67	243	339	65	56	312	187
Living alone	889	202	203	169	72	8	65	231	331	62	53	296	178
Spouse	49	120	103	18	36	2	51	164	139	58	30	173	98
Other relatives	36	83	88	13	20	3	21	79	67	28	13	78	24
Nonrelatives	4	9	2	17	17	3	2	13	6	2	1	12	10
Inmate of institution	–	–	46	–	–	–	–	–	–	–	–	–	–
Other, in group quarters	–	–	–	2	–	–	–	–	–	–	–	12	1
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	**590**	**1 100**	**1 785**	**327**	**290**	**32**	**534**	**1 336**	**1 366**	**444**	**295**	**945**	**711**
With own children under 18 years	353	452	1 006	163	107	12	243	513	617	208	125	298	309
Number of own children under 18 years	672	882	2 361	458	218	29	483	974	1 223	438	251	528	512
Married-couple families	**165**	**807**	**622**	**87**	**131**	**15**	**368**	**1 031**	**904**	**327**	**208**	**766**	**561**
With own children under 18 years	60	327	243	22	38	5	172	414	344	154	89	240	217
Number of own children under 18 years	115	650	524	56	85	14	353	794	666	337	180	442	369
Female householder, no husband present	**407**	**238**	**1 079**	**213**	**119**	**14**	**141**	**253**	**413**	**102**	**73**	**154**	**131**
With own children under 18 years	286	105	732	136	58	5	66	89	253	52	33	52	84
Number of own children under 18 years	546	199	1 778	393	110	13	123	166	530	97	68	78	131
MARITAL STATUS													
Male, 15 years and over	**598**	**1 454**	**2 003**	**495**	**583**	**59**	**668**	**1 719**	**1 645**	**564**	**414**	**1 276**	**935**
Single	214	401	954	243	200	22	163	363	422	143	110	315	254
Now married, except separated	177	845	669	98	151	17	391	1 087	962	346	222	787	582
Separated	32	26	91	33	66	3	14	39	50	8	17	8	11
Widowed	71	59	111	60	51	6	21	61	68	15	15	51	19
Divorced	104	123	178	61	115	11	79	169	143	52	50	115	69
Female, 15 years and over	**1 787**	**1 781**	**3 049**	**742**	**542**	**64**	**782**	**2 037**	**2 217**	**670**	**478**	**1 645**	**1 220**
Single	408	384	1 119	267	141	19	123	261	387	83	76	314	241
Now married, except separated	179	858	693	103	145	17	393	1 087	940	348	223	791	585
Separated	110	40	269	68	63	3	22	39	101	22	18	10	24
Widowed	820	334	516	211	140	18	144	393	511	134	102	386	211
Divorced	270	165	452	93	53	7	100	257	278	83	59	144	159

Table P-1. **General Characteristics of Persons: 1980**—Con.

[For meaning of symbols, see introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Chattanooga city, Hamilton County, Tenn.—Con.												
	Tract 0003	Tract 0004	Tract 0005	Tract 0006	Tract 0007	Tract 0008	Tract 0009	Tract 0010	Tract 0011	Tract 0012	Tract 0013	Tract 0014	Tract 0015
AGE													
Total persons	**3 463**	**4 847**	**954**	**3 369**	**3 945**	**1 913**	**459**	**2 149**	**2 611**	**4 634**	**3 283**	**4 495**	**1 832**
Under 5 years	354	363	40	254	226	153	3	89	194	381	286	254	93
5 to 9 years	450	373	29	232	196	136	1	69	163	414	277	167	82
10 to 14 years	454	348	33	208	212	143	–	56	126	360	196	166	109
15 to 19 years	404	408	62	249	243	160	12	461	188	422	366	1 052	128
20 to 24 years	280	471	97	335	337	185	110	581	302	433	382	1 249	140
25 to 34 years	485	718	168	570	761	260	203	297	439	748	530	561	199
35 to 44 years	276	369	86	279	344	173	58	119	162	412	264	231	168
45 to 54 years	228	501	122	322	416	209	33	110	270	437	254	222	224
55 to 64 years	248	526	134	360	452	226	26	155	287	370	287	222	270
65 to 74 years	172	500	103	312	467	182	11	126	278	358	238	231	263
75 years and over	112	270	80	248	291	86	2	86	202	299	203	140	156
3 and 4 years	138	131	20	91	83	59	–	30	77	145	107	91	29
16 years and over	2 120	3 694	839	2 623	3 267	1 445	455	1 922	2 103	3 399	2 449	3 871	1 534
18 years and over	1 933	3 527	814	2 530	3 158	1 385	452	1 886	2 030	3 217	2 285	3 760	1 483
21 years and over	1 752	3 259	774	2 369	3 018	1 294	432	1 290	1 891	2 981	2 096	2 462	1 389
60 years and over	401	1 040	236	733	970	379	26	299	636	827	561	485	561
62 years and over	352	938	220	667	880	329	22	260	562	753	516	437	501
Median	21.3	30.3	40.6	31.6	34.9	31.5	28.6	22.4	31.9	28.3	26.9	21.6	44.8
Female	**1 953**	**2 562**	**489**	**1 829**	**2 168**	**997**	**216**	**1 068**	**1 397**	**2 602**	**1 653**	**2 449**	**915**
Under 5 years	185	161	25	125	105	64	2	37	97	184	151	130	42
5 to 9 years	200	177	16	116	102	65	–	25	73	179	144	75	40
10 to 14 years	226	157	17	104	106	68	–	24	67	175	91	86	53
15 to 19 years	196	194	35	121	124	77	10	247	101	217	94	611	59
20 to 24 years	174	245	50	170	173	101	57	277	164	235	189	678	66
25 to 34 years	321	348	66	289	387	132	89	130	184	424	269	258	93
35 to 44 years	182	207	43	141	189	87	21	58	82	246	120	116	78
45 to 54 years	137	295	59	186	237	107	20	65	151	269	144	129	114
55 to 64 years	152	312	54	212	254	124	8	74	162	228	161	132	125
65 to 74 years	100	301	65	193	295	106	7	71	163	222	148	139	150
75 years and over	80	165	59	172	196	66	2	60	153	223	142	95	95
3 and 4 years	71	53	12	46	37	22	–	8	46	71	60	46	17
16 years and over	1 307	2 037	425	1 465	1 838	788	214	977	1 146	2 027	1 252	2 139	774
18 years and over	1 217	1 948	411	1 418	1 776	757	212	956	1 106	1 938	1 216	2 076	748
21 years and over	1 116	1 819	388	1 333	1 704	706	200	640	1 031	1 807	1 135	1 310	711
60 years and over	246	623	149	466	611	230	13	169	399	551	364	314	306
62 years and over	217	565	142	431	561	206	11	153	355	511	335	282	283
Median	24.9	35.0	43.9	34.6	39.2	34.1	27.2	22.4	36.0	31.6	29.9	21.5	47.8
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	**3 463**	**4 847**	**954**	**3 369**	**3 945**	**1 913**	**459**	**2 149**	**2 611**	**4 634**	**3 283**	**4 495**	**1 832**
In households	3 463	4 720	919	3 333	3 938	1 887	455	1 362	2 591	4 358	3 055	2 670	1 694
Householder	1 074	1 826	491	1 381	1 739	730	326	667	1 055	1 506	1 127	983	790
Family householder	824	1 240	193	873	1 135	492	77	249	659	1 133	803	669	337
Nonfamily householder	250	586	298	508	604	238	249	418	396	373	324	314	453
Living alone	235	527	265	444	542	218	207	354	338	325	268	261	400
Spouse	321	634	115	632	908	312	61	133	438	581	606	490	149
Other relatives	1 984	2 127	241	1 188	1 185	802	22	431	965	2 126	1 208	1 084	612
Nonrelatives	84	133	72	132	106	43	46	131	133	145	114	113	143
Inmate of institution	–	74	–	13	7	–	–	14	17	272	34	41	28
Other, in group quarters	–	53	35	23	–	26	4	773	3	4	194	1 784	110
Persons per household	3.22	2.58	1.87	2.41	2.26	2.58	1.40	2.04	2.46	2.89	2.71	2.72	2.14
Persons per family	3.80	3.23	2.84	3.08	2.84	3.26	2.08	3.27	3.13	3.39	3.26	3.35	3.26
Persons 65 years and over	**284**	**770**	**183**	**560**	**758**	**268**	**13**	**212**	**480**	**657**	**441**	**371**	**419**
In households	284	755	183	560	758	268	13	211	477	452	407	371	410
Householder	210	524	131	387	509	189	11	164	324	303	269	257	313
Nonfamily householder	117	217	90	186	241	88	8	119	174	117	124	120	212
Living alone	112	204	78	180	236	85	8	106	149	101	113	109	194
Spouse	42	136	21	110	170	41	1	14	70	77	71	65	43
Other relatives	26	83	21	59	72	36	1	20	73	55	55	42	34
Nonrelatives	6	12	10	4	7	2	–	13	10	17	12	7	20
Inmate of institution	–	5	–	–	–	–	–	1	3	205	34	–	1
Other, in group quarters	–	10	–	–	–	–	–	–	–	–	–	–	8
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	**824**	**1 240**	**193**	**873**	**1 135**	**492**	**77**	**249**	**659**	**1 133**	**803**	**669**	**337**
With own children under 18 years	544	538	47	353	414	209	3	98	257	616	365	304	109
Number of own children under 18 years	1 297	1 025	114	703	690	418	3	168	474	1 154	724	605	220
Married-couple families	**321**	**634**	**115**	**632**	**908**	**312**	**61**	**133**	**438**	**581**	**606**	**490**	**149**
With own children under 18 years	160	236	17	251	312	125	1	49	175	270	275	231	36
Number of own children under 18 years	340	469	43	508	531	254	1	80	324	544	553	464	68
Female householder, no husband present	**465**	**510**	**57**	**202**	**197**	**145**	**9**	**77**	**179**	**493**	**160**	**145**	**156**
With own children under 18 years	367	272	26	90	92	74	2	32	67	322	81	67	64
Number of own children under 18 years	919	508	62	174	143	152	2	59	122	573	154	130	134
MARITAL STATUS													
Male, 15 years and over	**863**	**1 696**	**421**	**1 191**	**1 456**	**681**	**241**	**953**	**968**	**1 415**	**1 257**	**1 750**	**768**
Single	367	594	158	326	344	203	107	635	302	549	464	1 078	256
Now married, except separated	348	718	131	666	942	339	64	167	474	623	633	524	171
Separated	37	85	16	21	18	18	9	41	49	49	34	31	111
Widowed	45	96	30	39	40	17	–	35	54	54	34	29	80
Divorced	66	203	86	139	112	104	61	75	89	140	92	88	150
Female, 15 years and over	**1 342**	**2 067**	**431**	**1 484**	**1 855**	**800**	**214**	**982**	**1 160**	**2 064**	**1 267**	**2 158**	**780**
Single	461	529	139	281	356	152	106	608	259	611	240	1 293	190
Now married, except separated	352	681	119	666	937	340	63	157	465	638	633	522	168
Separated	116	133	13	47	18	22	2	21	44	107	33	34	90
Widowed	198	440	98	275	303	158	8	96	275	396	229	186	241
Divorced	215	284	62	215	241	128	35	100	117	312	132	123	91

Table P-1. General Characteristics of Persons: 1980—Con.

[For meaning of symbols, see introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Walker County, Ga.											Chattanooga city, Hamilton County, Tenn.	
	Tract 0201	Tract 0202	Tract 0203	Tract 0204	Tract 0205	Tract 0206.01	Tract 0206.02	Tract 0207	Tract 0208	Tract 0209.01	Tract 0209.02	Tract 0001	Tract 0002
AGE													
Total persons	**7 328**	**4 061**	**9 239**	**2 837**	**11 456**	**3 629**	**2 515**	**7 840**	**2 550**	**3 791**	**1 224**	**3 370**	**1 666**
Under 5 years	531	278	658	209	982	293	175	639	222	266	85	248	142
5 to 9 years	526	266	725	217	1 003	326	199	659	213	328	99	225	145
10 to 14 years	549	232	760	251	989	322	223	663	239	333	107	235	162
15 to 19 years	649	307	856	222	1 016	286	253	686	260	340	130	257	189
20 to 24 years	598	335	824	174	982	246	199	574	173	279	87	279	144
25 to 34 years	1 060	562	1 389	418	1 873	630	369	1 177	412	511	159	465	230
35 to 44 years	893	385	1 241	396	1 419	503	322	880	316	464	168	272	152
45 to 54 years	864	504	1 063	257	1 079	344	295	758	235	444	109	340	183
55 to 64 years	787	513	909	346	1 030	351	230	841	242	327	127	442	145
65 to 74 years	554	419	534	234	669	215	169	646	153	291	97	340	115
75 years and over	317	260	280	113	414	113	81	317	85	208	56	267	59
3 and 4 years	229	106	267	91	382	115	58	266	75	100	31	88	50
16 years and over	5 585	3 227	6 919	2 104	8 257	2 619	1 860	5 740	1 817	2 786	906	2 613	1 173
18 years and over	5 332	3 109	6 555	1 997	7 830	2 513	1 749	5 455	1 708	2 644	846	2 497	1 101
21 years and over	4 950	2 902	6 058	1 908	7 265	2 349	1 635	5 076	1 580	2 454	781	2 351	999
60 years and over	1 237	928	1 249	496	1 552	504	357	1 355	352	668	220	830	242
62 years and over	1 076	829	1 079	428	1 352	434	319	1 173	317	611	190	749	215
Median	32.5	36.3	30.5	33.5	28.9	30.7	31.4	31.0	29.0	32.1	31.0	34.1	27.1
Female	**3 815**	**2 208**	**4 711**	**1 470**	**5 812**	**1 837**	**1 222**	**4 180**	**1 233**	**1 945**	**611**	**1 818**	**908**
Under 5 years	241	133	331	110	473	127	81	301	110	138	41	121	62
5 to 9 years	271	116	344	107	469	161	85	315	94	160	47	110	77
10 to 14 years	278	120	348	114	476	170	110	348	107	159	44	118	91
15 to 19 years	329	158	421	106	466	131	110	328	119	160	66	117	93
20 to 24 years	325	174	413	88	505	132	105	321	92	126	45	135	80
25 to 34 years	510	278	710	220	983	327	179	583	199	257	79	231	132
35 to 44 years	447	207	650	201	706	248	153	458	147	241	82	146	90
45 to 54 years	466	288	554	135	535	169	143	416	110	239	59	203	100
55 to 64 years	429	299	483	188	563	183	122	507	138	171	65	260	70
65 to 74 years	306	256	286	128	371	122	85	394	67	157	50	201	70
75 years and over	213	179	171	73	265	67	49	209	50	137	33	176	43
3 and 4 years	106	53	144	49	179	50	27	128	37	54	17	45	19
16 years and over	2 956	1 811	3 609	1 114	4 295	1 349	920	3 151	893	1 449	466	1 441	656
18 years and over	2 822	1 752	3 419	1 059	4 100	1 300	872	3 017	841	1 395	434	1 385	616
21 years and over	2 618	1 645	3 172	1 018	3 824	1 215	818	2 817	784	1 296	403	1 330	569
60 years and over	715	577	692	279	893	278	186	845	183	387	114	507	142
62 years and over	627	524	597	243	778	238	168	741	162	353	100	467	134
Median	33.9	41.0	31.9	34.4	30.1	31.3	32.5	33.0	29.7	33.6	32.6	39.7	28.6
HOUSEHOLD TYPE AND RELATIONSHIP													
Total persons	**7 328**	**4 061**	**9 239**	**2 837**	**11 456**	**3 629**	**2 515**	**7 840**	**2 550**	**3 791**	**1 224**	**3 370**	**1 666**
In households	7 225	3 961	9 239	2 837	11 445	3 629	2 515	7 799	2 550	3 686	1 224	3 370	1 666
Householder	2 592	1 588	3 207	1 029	3 815	1 226	861	2 826	816	1 252	422	1 289	515
Family householder	2 127	1 181	2 694	795	3 221	1 055	716	2 185	675	1 070	343	929	417
Nonfamily householder	465	407	513	234	594	171	145	641	141	182	79	360	98
Living alone	438	393	482	223	551	167	137	615	136	171	76	329	90
Spouse	1 832	953	2 372	718	2 830	948	638	1 711	614	941	306	661	256
Other relatives	2 728	1 363	3 577	1 063	4 679	1 438	992	3 185	1 107	1 466	480	1 349	863
Nonrelatives	73	57	83	27	121	17	24	77	13	27	16	71	32
Inmate of institution	92	100	-	-	-	-	-	37	-	105	-	-	-
Other, in group quarters	11	-	-	-	11	-	-	4	-	-	-	-	-
Persons per household	2.79	2.49	2.88	2.76	3.00	2.96	2.92	2.76	3.13	2.94	2.90	2.61	3.23
Persons per family	3.14	2.96	3.21	3.24	3.33	3.26	3.28	3.24	3.55	3.25	3.29	3.16	3.68
Persons 65 years and over	**871**	**679**	**814**	**347**	**1 083**	**328**	**250**	**963**	**238**	**499**	**153**	**607**	**174**
In households	787	586	814	347	1 083	328	250	963	238	401	153	607	174
Householder	528	396	518	240	712	214	158	699	158	261	103	417	105
Nonfamily householder	196	168	193	106	277	82	55	322	58	87	42	202	32
Living alone	193	165	189	104	271	81	53	313	58	85	41	189	30
Spouse	178	126	214	86	247	74	65	169	54	103	32	104	40
Other relatives	77	60	73	18	113	39	26	88	25	37	16	74	23
Nonrelatives	4	4	9	3	11	1	1	7	1	-	2	12	6
Inmate of institution	84	93	-	-	-	-	-	-	-	98	-	-	-
Other, in group quarters	-	-	-	-	-	-	-	-	-	-	-	-	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN													
Families	**2 127**	**1 181**	**2 694**	**795**	**3 221**	**1 055**	**716**	**2 185**	**675**	**1 070**	**343**	**929**	**417**
With own children under 18 years	970	490	1 352	406	1 757	567	383	1 111	388	555	183	384	221
Number of own children under 18 years	1 800	845	2 426	789	3 302	1 015	701	2 089	765	1 041	345	725	455
Married-couple families	**1 832**	**953**	**2 372**	**718**	**2 830**	**948**	**638**	**1 711**	**614**	**941**	**306**	**661**	**256**
With own children under 18 years	840	389	1 188	368	1 567	526	341	876	364	496	172	267	130
Number of own children under 18 years	1 584	672	2 165	715	2 948	947	633	1 652	717	937	329	503	273
Female householder, no husband present	**238**	**195**	**265**	**61**	**313**	**78**	**60**	**413**	**48**	**96**	**31**	**228**	**141**
With own children under 18 years	110	87	143	32	164	31	35	210	17	46	11	103	86
Number of own children under 18 years	183	151	229	58	314	52	59	391	36	85	16	200	173
MARITAL STATUS													
Male, 15 years and over	**2 697**	**1 446**	**3 408**	**1 021**	**4 088**	**1 309**	**972**	**2 663**	**954**	**1 376**	**454**	**1 193**	**539**
Single	508	267	709	221	866	243	205	601	233	290	99	313	185
Now married, except separated	1 901	996	2 436	732	2 916	970	660	1 778	631	975	316	692	268
Separated	35	17	48	9	45	11	18	56	10	10	7	27	16
Widowed	67	43	56	29	78	25	20	61	29	40	12	60	20
Divorced	186	123	159	30	183	60	69	167	51	61	20	101	50
Female, 15 years and over	**3 025**	**1 839**	**3 688**	**1 139**	**4 394**	**1 379**	**946**	**3 216**	**922**	**1 488**	**479**	**1 469**	**678**
Single	443	241	531	168	632	169	136	463	152	177	74	233	191
Now married, except separated	1 888	1 008	2 428	733	2 903	975	650	1 777	632	977	316	688	270
Separated	57	32	56	8	75	15	21	99	17	25	6	27	33
Widowed	433	362	393	148	534	150	89	572	93	226	58	328	100
Divorced	204	196	280	82	250	70	50	305	28	83	25	193	84

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts	Hamilton County, Tenn.—Con. Remainder	Marion County, Tenn.	Sequatchie County, Tenn.	Catoosa County, Ga. Tract 0301	Tract 0302	Tract 0303	Tract 0304	Tract 0305	Tract 0306	Tract 0307	Dade County, Ga. Tract 0401	Tract 0402
AGE												
Total persons	**72 222**	**24 416**	**8 605**	**3 909**	**4 961**	**5 220**	**7 664**	**3 186**	**6 133**	**5 918**	**9 045**	**3 273**
Under 5 years	5 347	1 842	681	305	392	453	596	240	423	379	656	299
5 to 9 years	6 109	2 044	734	366	434	519	730	275	500	456	760	315
10 to 14 years	6 291	2 098	796	318	455	524	664	260	505	506	772	297
15 to 19 years	6 735	2 322	805	373	432	454	645	327	532	580	923	315
20 to 24 years	5 869	1 931	683	307	373	419	562	304	503	466	847	320
25 to 34 years	12 670	3 703	1 369	678	836	1 015	1 386	489	995	865	1 487	504
35 to 44 years	9 938	3 009	1 084	519	660	733	1 112	390	788	794	1 115	436
45 to 54 years	7 482	2 559	831	414	490	485	795	374	760	724	851	311
55 to 64 years	5 832	2 146	699	290	399	331	601	259	564	591	774	272
65 to 74 years	3 777	1 802	575	225	344	197	392	201	373	364	528	147
75 years and over	2 172	960	348	114	146	90	181	67	190	193	332	57
3 and 4 years	2 153	785	257	128	169	193	255	92	181	164	267	115
16 years and over	53 169	17 911	6 213	2 833	3 585	3 627	5 534	2 354	4 603	4 451	6 689	2 301
18 years and over	50 501	16 956	5 877	2 671	3 396	3 426	5 258	2 228	4 384	4 185	6 344	2 152
21 years and over	46 462	15 740	5 456	2 493	3 161	3 185	4 910	2 027	4 078	3 894	5 738	1 979
60 years and over	8 528	3 752	1 267	475	680	435	847	397	818	825	1 229	339
62 years and over	7 393	3 336	1 124	422	587	369	728	346	705	703	1 083	282
Median	29.9	30.3	29.4	29.1	29.9	27.5	30.0	28.9	30.9	31.9	28.6	26.6
Female	**36 561**	**12 414**	**4 389**	**1 972**	**2 597**	**2 641**	**3 917**	**1 621**	**3 183**	**3 151**	**4 606**	**1 626**
Under 5 years	2 513	880	349	138	197	223	299	103	194	183	316	142
5 to 9 years	2 962	1 044	350	182	197	259	359	137	226	215	369	148
10 to 14 years	3 075	1 003	384	162	218	256	326	119	257	256	373	141
15 to 19 years	3 312	1 113	404	187	228	231	289	159	277	292	443	159
20 to 24 years	3 018	955	342	160	196	205	307	151	264	256	443	160
25 to 34 years	6 503	1 865	679	347	451	533	715	255	520	483	777	262
35 to 44 years	4 933	1 499	535	257	343	362	546	201	403	425	541	221
45 to 54 years	3 786	1 292	425	210	237	236	413	206	397	375	450	148
55 to 64 years	2 999	1 153	382	136	234	171	330	136	315	313	395	137
65 to 74 years	2 108	1 012	313	130	199	106	213	108	207	227	287	72
75 years and over	1 352	598	226	63	97	59	120	46	123	126	212	36
3 and 4 years	1 035	387	129	54	93	89	138	42	87	86	129	51
16 years and over	27 387	9 240	3 209	1 444	1 929	1 851	2 867	1 234	2 462	2 433	3 478	1 164
18 years and over	26 112	8 784	3 056	1 367	1 824	1 754	2 755	1 174	2 340	2 301	3 315	1 089
21 years and over	24 048	8 189	2 842	1 279	1 710	1 634	2 589	1 073	2 180	2 151	2 998	1 012
60 years and over	4 814	2 148	729	259	409	245	488	224	474	497	700	173
62 years and over	4 234	1 930	649	230	354	205	417	194	411	435	615	146
Median	30.5	31.5	30.4	29.5	30.8	27.8	30.5	31.0	32.0	32.8	29.5	27.0
HOUSEHOLD TYPE AND RELATIONSHIP												
Total persons	**72 222**	**24 416**	**8 605**	**3 909**	**4 961**	**5 220**	**7 664**	**3 186**	**6 133**	**5 918**	**9 045**	**3 273**
In households	70 639	24 230	8 473	3 909	4 944	5 220	7 664	3 186	6 117	5 916	8 652	3 273
Householder	23 665	8 270	2 891	1 291	1 693	1 652	2 585	1 133	2 132	2 162	2 944	1 054
Family householder	20 235	6 800	2 409	1 117	1 416	1 470	2 205	897	1 801	1 736	2 426	922
Nonfamily householder	3 430	1 470	482	174	277	182	380	236	331	426	518	132
Living alone	3 120	1 427	458	157	263	168	363	214	298	402	481	124
Spouse	18 062	5 838	2 068	989	1 222	1 350	1 984	739	1 548	1 435	2 091	811
Other relatives	28 186	9 925	3 440	1 577	1 983	2 178	3 044	1 273	2 375	2 261	3 476	1 374
Nonrelatives	726	197	74	52	46	40	51	41	62	58	141	34
Inmate of institution	337	140	65	-	17	-	-	-	16	-	68	-
Other, in group quarters	1 246	46	67	-	-	-	-	-	-	2	325	-
Persons per household	2.98	2.93	2.93	3.03	2.92	3.16	2.96	2.81	2.87	2.74	2.94	3.11
Persons per family	3.29	3.32	3.29	3.30	3.26	3.40	3.28	3.24	3.18	3.13	3.29	3.37
Persons 65 years and over	**5 949**	**2 762**	**923**	**339**	**490**	**287**	**573**	**268**	**563**	**557**	**860**	**204**
In households	5 653	2 641	847	339	490	287	573	268	554	557	797	204
Householder	3 614	1 799	574	209	340	178	384	187	351	381	540	140
Nonfamily householder	1 335	716	206	79	149	71	156	78	125	179	218	50
Living alone	1 282	706	203	78	144	69	155	77	120	176	214	49
Spouse	1 305	593	198	79	105	60	112	58	126	112	161	45
Other relatives	684	237	70	45	44	48	74	20	72	57	84	18
Nonrelatives	50	12	5	6	1	1	3	3	5	7	12	1
Inmate of institution	286	116	54	-	-	-	-	-	9	-	63	-
Other, in group quarters	10	5	22	-	-	-	-	-	-	-	-	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN												
Families	**20 235**	**6 800**	**2 409**	**1 117**	**1 416**	**1 470**	**2 205**	**897**	**1 801**	**1 736**	**2 426**	**922**
With own children under 18 years	11 078	3 619	1 309	618	749	895	1 245	490	931	928	1 323	518
Number of own children under 18 years	20 194	6 634	2 457	1 138	1 412	1 685	2 247	874	1 610	1 613	2 457	997
Married-couple families	**18 062**	**5 838**	**2 068**	**989**	**1 222**	**1 350**	**1 984**	**739**	**1 548**	**1 435**	**2 091**	**811**
With own children under 18 years	9 973	3 187	1 150	544	645	823	1 124	400	804	736	1 155	451
Number of own children under 18 years	18 325	5 875	2 169	1 017	1 209	1 558	2 018	731	1 406	1 322	2 164	892
Female householder, no husband present	**1 728**	**761**	**270**	**104**	**166**	**98**	**182**	**134**	**209**	**261**	**255**	**77**
With own children under 18 years	922	353	127	60	91	58	99	82	108	173	136	50
Number of own children under 18 years	1 572	640	238	101	180	105	189	131	176	268	232	80
MARITAL STATUS												
Male, 15 years and over	**26 464**	**8 945**	**3 088**	**1 430**	**1 695**	**1 821**	**2 741**	**1 149**	**2 199**	**2 080**	**3 309**	**1 167**
Single	6 086	2 076	653	306	308	336	535	238	429	438	869	235
Now married, except separated	18 585	6 051	2 136	1 018	1 265	1 375	2 015	769	1 591	1 469	2 157	834
Separated	181	99	29	14	28	11	20	23	25	13	23	19
Widowed	449	215	78	31	28	28	47	21	35	41	81	21
Divorced	1 163	504	192	61	66	71	124	98	119	119	179	58
Female, 15 years and over	**28 011**	**9 487**	**3 306**	**1 490**	**1 985**	**1 903**	**2 933**	**1 262**	**2 506**	**2 497**	**3 548**	**1 195**
Single	4 833	1 456	488	233	310	252	403	179	374	406	696	167
Now married, except separated	18 541	6 048	2 148	1 022	1 261	1 377	2 022	770	1 586	1 473	2 151	836
Separated	265	111	34	17	30	19	42	29	37	41	56	19
Widowed	2 731	1 308	437	139	243	149	297	136	291	337	453	112
Divorced	1 641	564	199	79	141	106	169	148	218	240	192	61

Table P-1. General Characteristics of Persons: 1980

[For meaning of symbols, see Introduction. For definitions of terms, see appendixes A and B]

Census Tracts	The SMSA	Georgia (pt.)	Catoosa County, Ga.	Dade County, Ga.	Walker County, Ga.	Tennessee (pt.)	Hamilton County, Tenn.				
							Total	Chattanooga city	East Ridge city	Middle Valley (CDP)	Red Bank city
AGE											
Total persons	426 540	105 779	36 991	12 318	56 470	320 761	287 740	169 565	21 236	11 420	13 297
Under 5 years	30 697	8 081	2 788	955	4 338	22 616	20 093	11 912	1 063	1 032	739
5 to 9 years	33 212	8 916	3 280	1 075	4 561	24 296	21 518	12 165	1 226	1 212	806
10 to 14 years	34 120	8 969	3 232	1 069	4 668	25 151	22 257	12 546	1 432	1 139	849
15 to 19 years	38 595	9 586	3 343	1 238	5 005	29 009	25 882	15 309	1 722	959	1 157
20 to 24 years	37 883	8 572	2 934	1 167	4 471	29 311	26 697	16 640	1 963	703	1 522
25 to 34 years	69 899	16 815	6 264	1 991	8 560	53 084	48 012	27 033	3 368	2 553	2 388
35 to 44 years	50 544	13 534	4 996	1 551	6 987	37 010	32 917	17 198	2 473	1 787	1 521
45 to 54 years	45 278	11 156	4 042	1 162	5 952	34 122	30 732	18 206	2 718	1 019	1 307
55 to 64 years	40 011	9 784	3 035	1 046	5 703	30 227	27 382	16 991	2 680	548	1 331
65 to 74 years	29 063	6 752	2 096	675	3 981	22 311	19 934	13 073	1 693	309	1 082
75 years and over	17 238	3 614	981	389	2 244	13 624	12 316	8 492	898	159	595
3 and 4 years	12 126	3 284	1 182	382	1 720	8 842	7 800	4 501	418	439	289
16 years and over	320 989	77 797	26 987	8 990	41 820	243 192	219 068	130 183	17 190	7 834	10 692
18 years and over	305 454	73 782	25 548	8 496	39 738	231 672	208 839	124 255	16 479	7 391	10 213
21 years and over	282 243	68 423	23 748	7 717	36 958	213 820	192 624	114 276	15 444	6 940	9 502
60 years and over	64 716	14 963	4 477	1 568	8 918	49 753	44 734	29 413	3 801	702	2 290
62 years and over	56 872	13 033	3 860	1 365	7 808	43 839	39 379	26 083	3 265	594	2 044
Median	30.4	30.3	29.9	28.1	31.1	30.4	30.5	30.5	34.3	28.1	30.9
Female	221 972	54 358	19 082	6 232	29 044	167 614	150 811	90 250	11 382	5 707	6 911
Under 5 years	14 776	3 881	1 337	458	2 086	10 895	9 666	5 786	517	483	367
5 to 9 years	16 158	4 261	1 575	517	2 169	11 897	10 503	5 919	635	588	399
10 to 14 years	16 643	4 382	1 594	514	2 274	12 261	10 874	6 189	695	548	367
15 to 19 years	18 823	4 659	1 663	602	2 394	14 164	12 647	7 551	817	455	512
20 to 24 years	19 738	4 468	1 539	603	2 326	15 270	13 973	8 688	1 056	376	835
25 to 34 years	35 799	8 668	3 304	1 039	4 325	27 131	24 587	13 805	1 735	1 352	1 192
35 to 44 years	25 989	6 839	2 537	762	3 540	19 150	17 116	9 215	1 350	856	762
45 to 54 years	23 847	5 786	2 074	598	3 114	18 061	16 344	9 872	1 504	502	680
55 to 64 years	21 741	5 315	1 635	532	3 148	16 426	14 891	9 387	1 470	266	769
65 to 74 years	16 994	3 771	1 190	359	2 222	13 223	11 898	7 992	978	183	637
75 years and over	11 464	2 328	634	248	1 446	9 136	8 312	5 846	625	98	391
3 and 4 years	5 902	1 613	589	180	844	4 289	3 773	2 190	200	206	142
16 years and over	170 822	40 875	14 220	4 642	22 013	129 947	117 498	71 042	9 386	3 997	5 686
18 years and over	163 387	38 930	13 515	4 404	21 011	124 457	112 617	68 183	9 033	3 786	5 503
21 years and over	151 574	36 236	12 616	4 010	19 610	115 338	104 307	63 033	8 524	3 572	5 130
60 years and over	38 524	8 618	2 596	873	5 149	29 906	27 029	18 209	2 241	384	1 381
62 years and over	34 258	7 538	2 246	761	4 531	26 720	24 141	16 368	1 962	335	1 242
Median	31.8	31.4	30.7	28.8	32.5	31.9	31.9	32.5	36.7	28.4	32.6
HOUSEHOLD TYPE AND RELATIONSHIP											
Total persons	426 540	105 779	36 991	12 318	56 470	320 761	287 740	169 565	21 236	11 420	13 297
In households	417 346	104 991	36 956	11 925	56 110	312 355	279 652	163 390	21 079	11 420	13 124
Householder	150 760	36 280	12 648	3 998	19 634	114 480	103 319	62 139	8 377	3 527	5 611
Family householder	117 212	30 052	10 642	3 348	16 062	87 160	77 951	44 320	6 411	3 229	3 756
Nonfamily householder	33 548	6 228	2 006	650	3 572	27 320	25 368	17 819	1 966	298	1 855
Living alone	30 489	5 859	1 865	605	3 389	24 630	22 745	15 950	1 769	271	1 635
Spouse	96 344	26 032	9 267	2 902	13 863	70 312	62 406	32 904	5 354	2 958	3 128
Other relatives	163 366	41 619	14 691	4 850	22 078	121 747	108 382	64 340	6 948	4 848	4 060
Nonrelatives	6 876	1 060	350	175	535	5 816	5 545	4 007	400	87	325
Inmate of institution	3 897	435	33	68	334	3 462	3 257	2 798	122	-	-
Other, in group quarters	5 297	353	2	325	26	4 944	4 831	3 377	35	-	173
Persons per household	2.77	2.89	2.92	2.98	2.86	2.73	2.71	2.63	2.52	3.24	2.34
Persons per family	3.22	3.25	3.25	3.32	3.24	3.20	3.19	3.19	2.92	3.42	2.91
Persons 65 years and over	46 301	10 366	3 077	1 064	6 225	35 935	32 250	21 565	2 591	468	1 677
In households	44 119	10 019	3 068	1 001	5 950	34 100	30 612	20 340	2 474	468	1 677
Householder	29 736	6 697	2 030	680	3 987	23 039	20 666	14 073	1 582	268	1 129
Nonfamily householder	13 118	2 691	837	268	1 586	10 427	9 505	6 967	626	100	477
Living alone	12 661	2 635	819	263	1 553	10 026	9 117	6 659	609	98	469
Spouse	9 126	2 206	652	206	1 348	6 920	6 129	3 737	577	116	394
Other relatives	4 779	1 034	360	102	572	3 745	3 438	2 225	300	80	149
Nonrelatives	478	82	26	13	43	396	379	305	15	4	5
Inmate of institution	2 051	347	9	63	275	1 704	1 534	1 136	112	-	-
Other, in group quarters	131	-	-	-	-	131	104	89	5	-	-
FAMILY TYPE BY PRESENCE OF OWN CHILDREN											
Families	117 212	30 052	10 642	3 348	16 062	87 160	77 951	44 320	6 411	3 229	3 756
With own children under 18 years	59 080	15 859	5 856	1 841	8 162	43 221	38 293	20 789	2 670	2 115	1 641
Number of own children under 18 years	108 284	29 151	10 579	3 454	15 118	79 133	70 042	38 906	4 398	3 818	2 726
Married-couple families	96 344	26 032	9 267	2 902	13 863	70 312	62 406	32 904	5 354	2 958	3 128
With own children under 18 years	48 149	13 809	5 076	1 606	7 127	34 340	30 003	14 630	2 129	1 955	1 316
Number of own children under 18 years	88 548	25 616	9 261	3 056	13 299	62 932	54 888	27 143	3 628	3 554	2 238
Female householder, no husband present	17 485	3 284	1 154	332	1 798	14 201	13 170	9 791	903	215	533
With own children under 18 years	9 655	1 743	671	186	886	7 912	7 432	5 588	494	131	297
Number of own children under 18 years	17 694	3 036	1 150	312	1 574	14 658	13 780	10 846	701	214	447
MARITAL STATUS											
Male, 15 years and over	154 116	37 979	13 115	4 476	20 388	116 137	104 104	60 586	7 980	3 949	5 125
Single	38 341	7 936	2 590	1 104	4 242	30 405	27 676	17 760	1 712	758	1 360
Now married, except separated	99 787	26 804	9 502	2 991	14 311	72 983	64 796	34 498	5 503	3 003	3 207
Separated	2 244	442	134	42	266	1 802	1 674	1 352	62	23	56
Widowed	3 759	793	231	102	460	2 966	2 673	1 940	160	30	94
Divorced	9 985	2 004	658	237	1 109	7 981	7 285	5 036	543	135	408
Female, 15 years and over	174 395	41 834	14 576	4 743	22 515	132 561	119 768	72 356	9 535	4 088	5 778
Single	32 353	6 206	2 157	863	3 186	26 147	24 203	16 120	1 547	589	1 114
Now married, except separated	99 576	26 785	9 511	2 987	14 287	72 791	64 595	34 355	5 489	3 003	3 207
Separated	3 303	701	215	75	411	2 602	2 457	2 010	101	23	58
Widowed	23 831	5 215	1 592	565	3 058	18 616	16 871	11 760	1 379	252	749
Divorced	15 332	2 927	1 101	253	1 573	12 405	11 642	8 111	1 019	221	650

Site No. TND 033272 51

Reference No. 13

NEIGHBORHOOD ANALYSIS

South Center City

Planning District No. 2

A. Introduction

Location (Map follows)

Planning District No. 2 includes the southwestern part of the City of Chattanooga and the eastern slopes of Lookout Mountain. It is bounded

on the north by I-24 and Chattanooga Creek,
on the east by the Town of East Ridge,
on the south by the Tennessee-Georgia state line, and
on the west at the top of Lookout Mountain.

Census Tracts 18, 19, 23, 24, and 25 are included in this district.

Locally, Census Tract 18 is known as St. Elmo;
Census Tract 19 is known as Alton Park; and
Census Tracts 23, 24, and 25 are known as East Lake and Missionary Ridge.

Historical Background

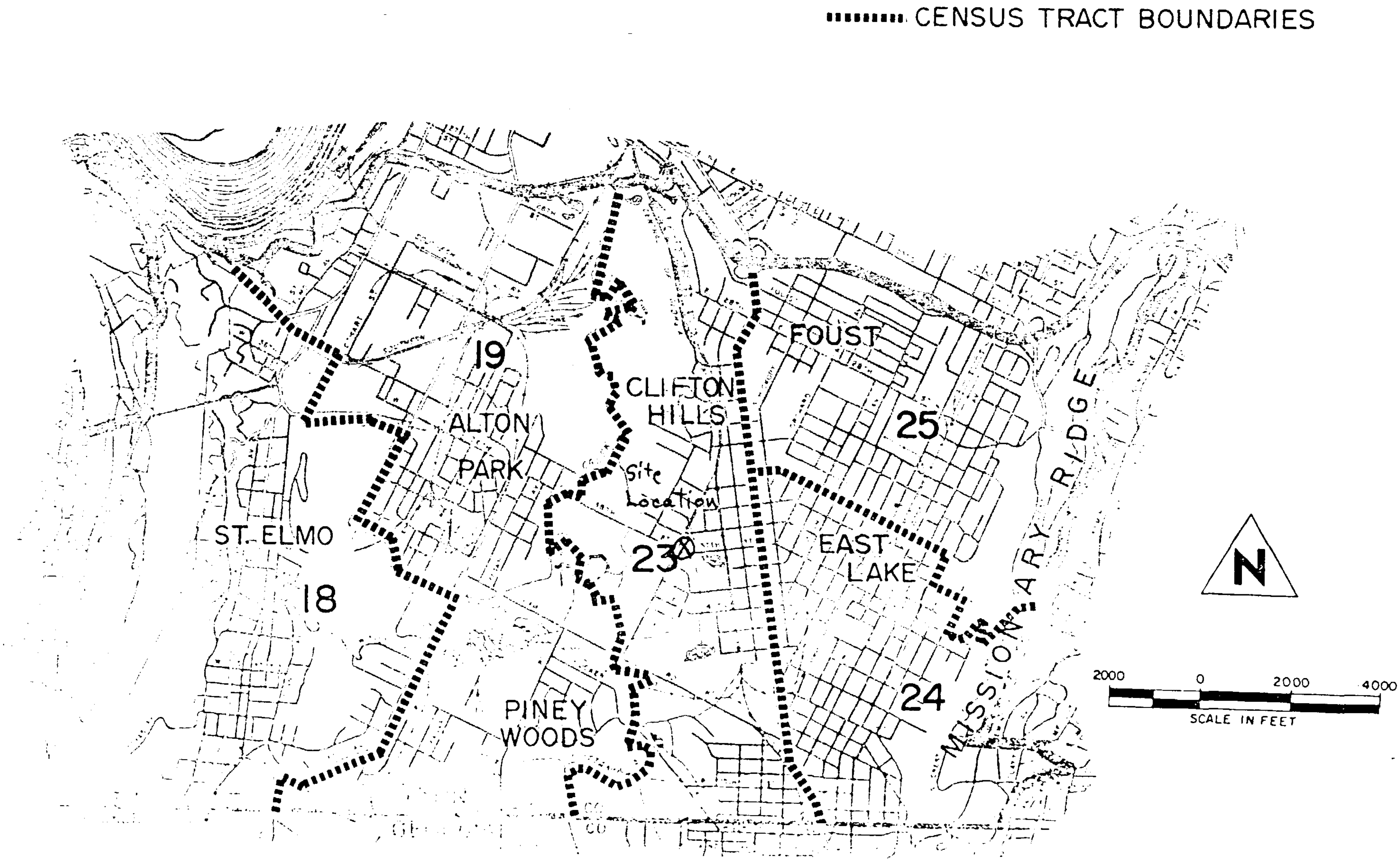
The settlement in this area probably began between 1860 and 1865. An 1886 lithograph shows Broad Street, a mill, the railroad crossing Chattanooga Creek, a bridge across Chattanooga Creek in the vicinity of Alton Park Boulevard, and Rossville Boulevard.

East Lake (Census Tracts 23, 24, and 25) was annexed to the City of Chattanooga in 1925.

St. Elmo, Alton Park, and Missionary Ridge were incorporated satellite cities, but gave up their charters and were annexed to Chattanooga in 1930.

PLANNING DISTRICT 2

NEIGHBORHOODS & CENSUS TRACTS



B. Nature of the Land and Surrounding Influences

Land Area

Planning District No. 2 has a total area of 6,377 acres, or about 9.9 square miles. Less than 1% of the area is water surface and 38% is vacant land. The large percentage of vacant land is due to the fact that most of the land in the middle of the district is low, swampy, and subject to flooding; and some land on the east and west of the district is very steep.

Topography

The western edge of the district is on the slopes of Lookout Mountain. The eastern edge is Missionary Ridge, reaching an elevation of about 1,200 feet, about 550 feet above the valley. There is a ridge in the southern part of the district between Census Tracts 18 and 19.

The land around Chattanooga Creek (the eastern and northern boundaries of Census Tract 19) is low, swampy, and subject to flood. This portion of Chattanooga Creek was re-channelized in 1968 to accommodate the railroad Relocation Project. However, this action has had little effect in improving the flood situation in the area.

Land Use (Map follows)

The land use pattern in Planning District No. 2 is quite varied. St. Elmo is an older residential neighborhood and tourist oriented commercial development in the northern end at the foot of the Incline Railway.

Alton Park is a neighborhood of mixed housing and heavy industry, with no strong neighborhood commercial focus. There are two public housing projects and a very small amount of 221-D-3 housing developments in the residential areas. Truck terminals occupy some of the land at the north end of the neighborhood along Alton Park Boulevard. Broad Street, in the northwest part of this area, is oriented to tourist traffic.

East Lake is an older, residential neighborhood with strip commercial development along Rossville Boulevard. The only real community commercial center is adjacent to Rossville, Georgia, at the state line. There is some heavy industry along the Belt line Railroad west of Dodds Avenue and some truck terminals in the northwest corner of Tract 25 near I-24.

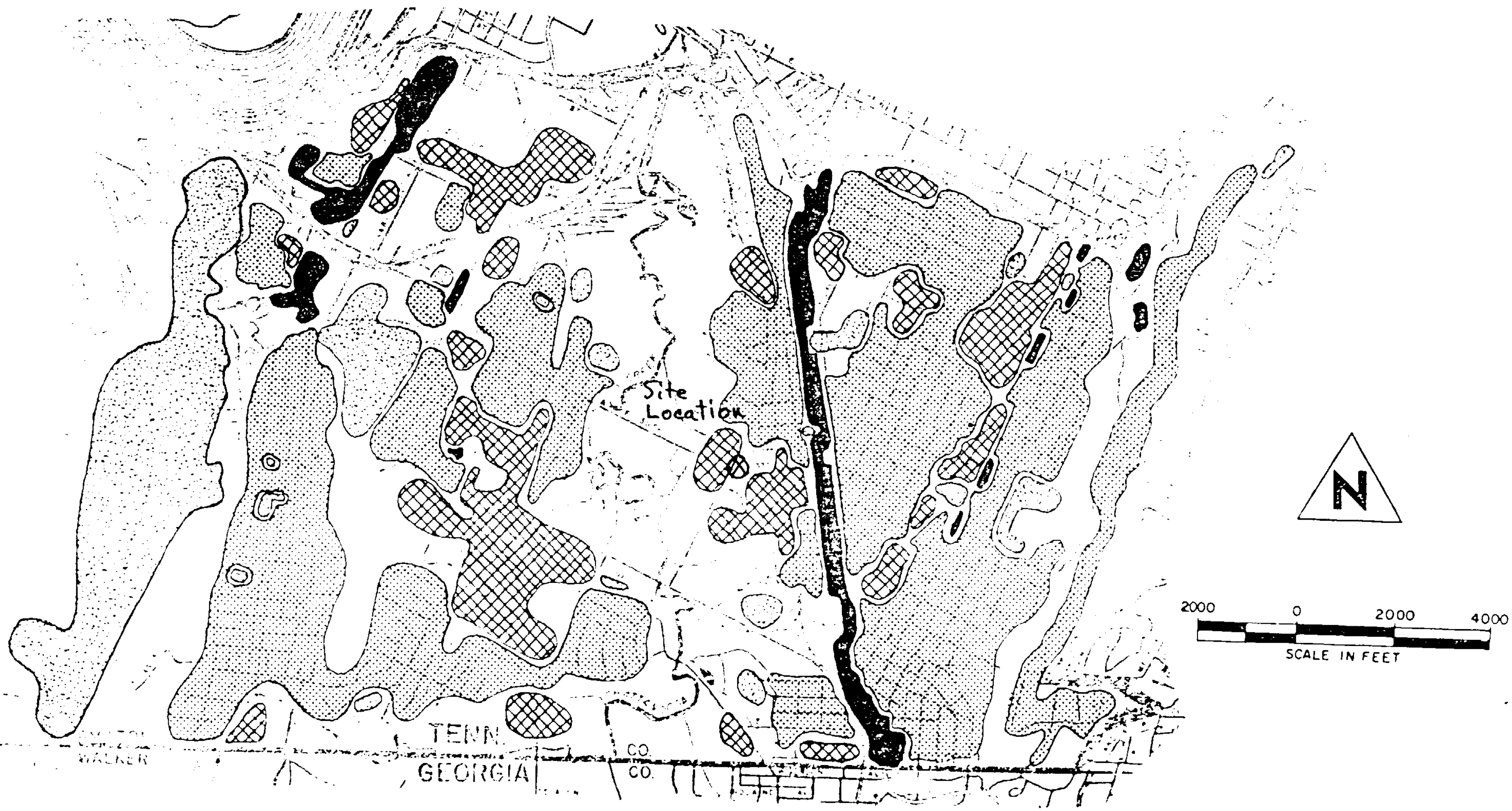
Missionary Ridge, on the east of the district, is an older, upper and upper-middle class neighborhood developed to take advantage of the views. These are primarily single-family homes, but many of the larger ones have been converted to multiple dwellings.

There is a large cemetery, Forest Hills Cemetery, on the ridge between St. Elmo and Alton Park.

PLANNING DISTRICT 2

EXISTING LAND USE (generalized)

RESIDENTIAL
COMMERCIAL
INDUSTRIAL
PUBLIC, SEMI-PUBLIC
VACANT



Land Use
(Cont.)

Table No. 1*						
Land Use						
Use	Census Tracts					
	18	19	23	24	25	Total
Residential Acreage	380.9	317.2	179.3	388.3	376.4	1642.1 (26%)
Industrial Acreage	37.2	211.5	81.5	23.7	64.0	417.9 (7%)
Commercial Acreage	15.8	65.3	60.7	46.0	35.5	223.3 (3%)
Institutional, Recreational Acreage	183.9	51.3	17.7	26.2	47.6	326.7 (5%)
Trans., Comm. & Util. Acreage	17.0	223.7	31.9	6.6	47.4	326.6 (5%)
Streets Acreage	251.0	200.1	152.4	160.8	241.0	1005.3 (16%)
Vacant & Water Acreage	845.2	680.5	576.7	113.7	219.0	2435.1 (38%)

*Source: Chattanooga-Hamilton County Regional Planning Commission Land Use Study - 1970

Major Street Systems (Map follows)

The major street systems in this district include I-24 and portions of five highways:

U. S. 11 and 64 - (Broad Street and Cummings Highway)
Tennessee 58 - Ochs Highway, West 40th Street, Alton Park Boulevard)
Tennessee 17 - (St. Elmo Avenue)
U. S. 27 - (Rossville Boulevard)
U. S. 41 - (Bachman Tubes and Westside Drive)

In addition, Dodds Avenue, 4th Avenue, Hooker Road, and 38/37 Streets serve as major arterials. Good east-west circulation is limited by the Chattanooga Creek.

ajor Street ystems Cont.)

Collector streets in Planning District No. 2 include: South Crest Road, E. 28th Street, S. Hickory Street, Hamill Road, W. 40th Street, Tennessee Avenue, E. 49th Street, E. 44th Street, E. 34th Street, W. Shadow Lawn, Westside Drive, Jerome Avenue, W. 45th Street and 33rd Street.

raffic and ccidents

The traffic volumes on the highways in this district are summarized in the table below, ranked in order by traffic volume:

Table No. 2*

Traffic Volume

Location	Average Daily Traffic
1. I-24	72,000
2. Rossville Blvd. (at 49th Street)	27,000 (not on map)
3. Rossville Blvd. (at 38th Street)	25,000
4. Westside Drive (at Bachman Tubes)	22,000
5. South Broad (at 35th Street)	21,000
6. South Market Street	12,000 (not on map)
7. St. Elmo Avenue	8,000
8. Cummings Highway	8,000
9. West 40th Street	4,000
10. Ochs Highway	3,000
11. Hooker Road	3,000

*Source: Tennessee Dept. of Transportation

The accident rates in the City of Chattanooga, measured in accidents per mile of streets over a seven-month period in 1968, ranged from 2 accidents/mile to 14.6 accidents/mile, with the average being 5.4 accident/mile. District No. 2 had 3.6 accident/mile of streets, or below the city average.

ils

There are about 400 acres of vacant land that have potential for development in terms of soil types and topographic features. This land consists of some of the gradual slopes on Missionary Ridge, parts of the ridge between St. Elmo and Alton Park, and some other scattered sites in between.

Drainage

All of District No. 2 drains toward Chattanooga Creek as it meanders through this area. This creek has a very shallow gradient, and many times the water in the stream moves very slowly, if at all. This aggravates the pollution problem, since the waters, once polluted remain almost stationary for long periods within the district.

Water Pollution

"Chattanooga Creek is without a doubt the most grossly polluted stream in the Chattanooga area," according to the Stream Control Division of the Tennessee Department of Public Health. This pollution is the result of industrial activity within the district and other manufacturing concerns immediately south of the district in Georgia. Since these Georgia industrial facilities are not controlled by the Tennessee State Regulations, application of a federal program is highly desirable in improving water quality within District No. 2. Seven sampling stations were established on Chattanooga Creek in 1964. A summary of latest available data from these stations is given below:

Table No. 3*

Water Pollution in Chattanooga Creek

Item Measured	Chattanooga Creek Measurements	Measured against
Dissolved Oxygen Content	.1 ppm to 2.6 ppm	3 ppm is a bare minimum to sustain fish life. Seldom should it be below 4 ppm.
Biochemical Oxygen Demand (B. O. D.)	5.6 ppm to 24.1 ppm	B. O. D. greater than 5 ppm indicates organic pollution.
Coliform Bacteria	8,000 to 35,000/100 ml	More than 1,000/100 ml of water is evidence of pollution.
Fecal streptococci	2,900 to 105,000 colonies/100 ml	More than 100 colonies/ 100 ml of water indicates a high degree of recent fecal pollution.

*Source: Tennessee Stream Pollution Control Division

The measurements and locations of the stations indicate that a considerable amount of the pollution originated below the state line, and that a large amount of the pollution, particularly the coliform bacteria and the fecal streptococci, originated in District No. 2.

Water Pollution (Cont.)

The measurements and locations of the stations indicate that a considerable amount of the pollution originated below the state line, and that a large amount of the pollution, particularly the coliform bacteria and the fecal streptococci, orginated in District No. 2.

Air Pollution

One station for sampling air pollution is established at South Broad Street. The results from this station are summarized below:

Table No. 4*		
Air Pollution (March, 1972 - March, 1973)		
Item Measured	Amount	Measured Against
Suspended particulate concentration	93.2 micrograms per cubic meter of air	50 micrograms for residential areas, 75 micrograms for commercial areas, 100 micrograms for industrial areas.

*Source: Chatt.-Ham. Co. Air Pollution Bureau

The problem of this excessive pollution is compounded by the fact that District No. 2 is in an "inversion bowl" created by Lookout Mountain and Missionary Ridge.

Flooding (Map follows)

Much of District No. 2 is subject to flood, both from headwater flooding on Chattanooga Creek and from back-water flooding from the Tennessee River. The accompanying map shows the extent of the area covered by the valley zone and the area covered by the "100-Year Flood".

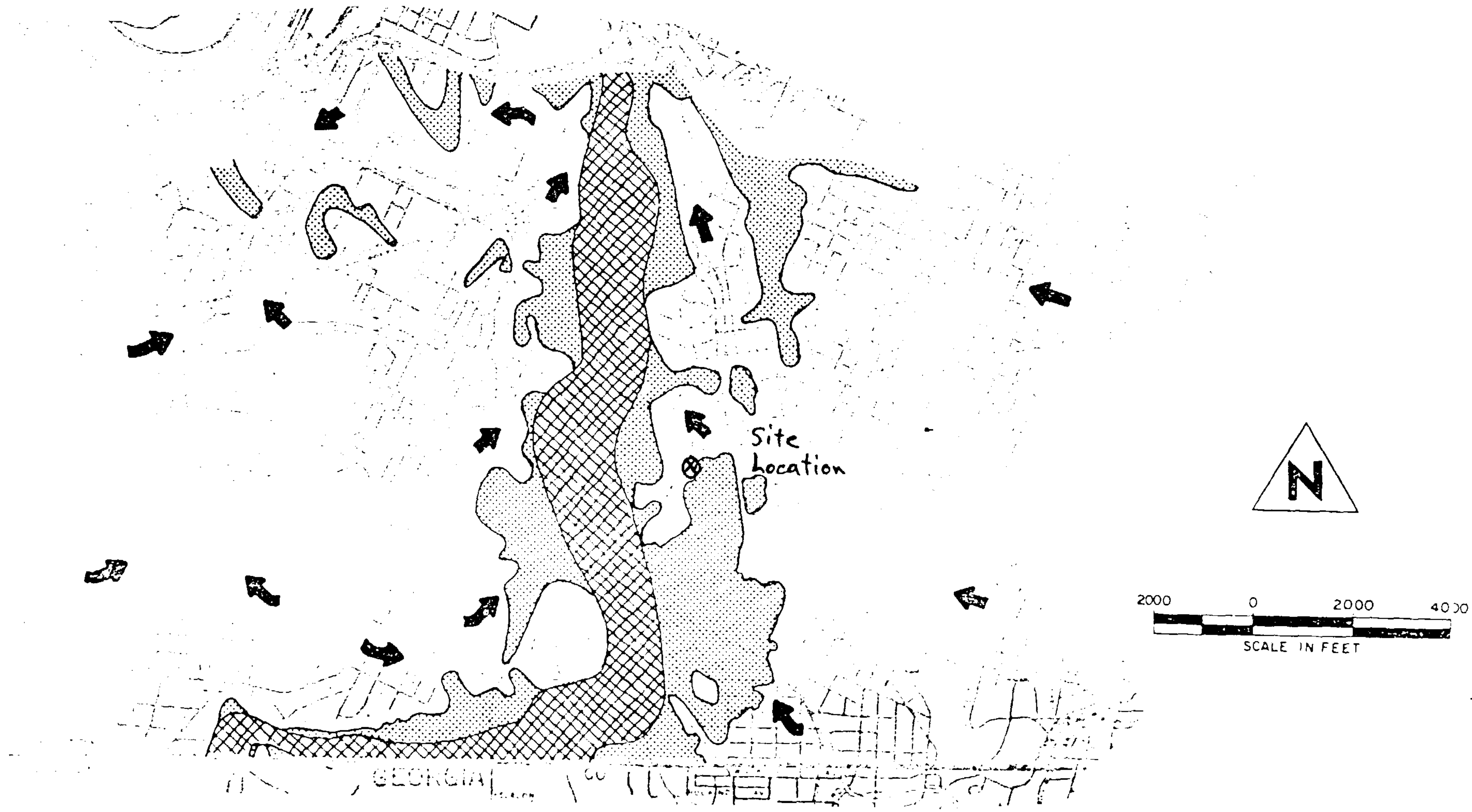
Summary

District No. 2 is made up of four older residential neighborhoods, cut up by several ridges and Chattanooga Creek, which periodically floods much of its surrounding lowlands. Industrial and strip commercial development occupy about 15% of the total area, further cutting up the residential sections of this district.

PLANNING DISTRICT 2

DRAINAGE & FLOODABLE AREA

FLOW of DRAINAGE
VALLEY ZONE
100year FLOOD



Other Public Community Facilities

Although there are no branch libraries within District No. 2, there is one located immediately to the north at Howard High School. There are three bookmobile stops in the District. Two of these stops are in Tract 19 and the third is in Tract 25.

The South Area Center, located on 37th. Street is a neighborhood service center of the Community Action Program. The services consists of adult education, medical assistance for infants and persons over 65, dental services, a family planning clinic and an immunization clinic,and a home management consultant.

Utilities

Since District No. 2 is located within the City of Chattanooga, it is served by the City's gas, water, electricity and telephone companies. Service appears adequate. Sanitary sewers are provided for the entire District, with the exception of two small areas in Tract 19. These areas are so low that a pump station would be required to lift the sewage out of them and into the regular sewer pipes.

Storm Sewers

Storm sewers were mentioned earlier in conjunction with streets and curbs. Since about 42% of the streets in the district have curbs, it is indicated that about the same amount of the streets have storm sewers or other drainage structures.

Street Lighting

The street lighting program recently completed by the City of Chattanooga has upgraded the street lighting quality in District No. 2. At present,

7.8 miles of streets are lighted to highway standards,
8.3 miles of streets are lighted to major arterial standards,
10.3 miles of streets are lighted to collector standards.

In addition, all residential streets, with the exception of a few small, scattered segments are well lighted.

Semi-Public Facilities

There are 65 churches located within District No. 2, or about one church for every 450 persons. This is a greater proportion of churches to population than the city average of one church per 625 persons. This would suggest that either people from outside the district attend church within District No. 2, or, as is probably the case, that there are a number of small churches within the District.

There are three day-care centers within District No. 2. One of these is located in Tract 19, one in Tract 25, and the third in Tract 18. This is probably a reasonable distribution of these facilities.

Solid Waste Disposal

Like the rest of Chattanooga, garbage is collected twice weekly from residents in District No. 2. Restaurants get more frequent service, up to four days weekly, and businesses usually get rid of trash themselves. The City also maintains brush collection upon request and will collect brush any of the five-day work week.

Site No. TND 003327251

Reference No. 14

WATER QUALITY MANAGEMENT PLAN
FOR THE
LOWER TENNESSEE RIVER BASIN

November, 1978

PRODUCED BY
TENNESSEE DEPARTMENT OF PUBLIC HEALTH
DIVISION OF WATER QUALITY CONTROL
309 CAPITOL TOWERS
NASHVILLE, TENNESSEE 37219

Authorization No. 0871 ; 150 copies printed. This document was printed at a cost of 2780.50 , or '18.54 each, to fulfill a requirement of EPA Grant No. P004193010 to the State of Tennessee and Section 208 of the Federal Water Pollution Control Act Amendments of 1972.

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Fish and Aquatic Life

One of the most important uses of the streams in the basin is for the growth and propagation of fish and other aquatic life. Fishing provides a major recreational outlet for visitors and residents of the area, as evidenced by the 35,977 fishing licenses issued in 1977. But more important than their recreational value, fish and the complex aquatic food chain which supports them represent an important and integral part of our environment.

The waters of the basin support a wide variety of fish species. When considering only those species most important to the fisherman, three broad categories may be established: warm water species, cool water species, and cold water species. The warm water species include the largemouth bass, bluegill, crappie, suckers, and carp. The cool water species include smallmouth bass, rockbass, sauger, walleye and yellow perch. Numerous streams within the basin support good populations of rainbow and brown trout, which are classified as a cold water species.

All streams within the basin, except three which are contained within private ownership boundaries, are classified for fish and aquatic life. The criteria applying to this stream classification includes specific temperature limits. The maximum allowable temperature in these streams, except recognized trout streams, is 30.5 degrees Centigrade. Trout waters must be maintained below a maximum of 20.0 degrees Centigrade. Observations by the Tennessee Wildlife Resources Agency have indicated that cool water fish species are normally found in streams with maximum temperatures of less than 28.0 degrees Centigrade. The Wildlife Resources Agency has recommended to the Tennessee Water Quality Control Board that a number of streams or sections of streams in the basin be classified as coolwater streams, and that criteria be adopted to limit the maximum temperature of these streams to 28.0 degrees Centigrade. A list of these streams is given in Table III–4. The Division of Water Quality Control will be guided by this recommended maximum temperature when effluent limits for coolwater streams are established.

Recreation

The major forms of water related recreation in the basin are boating, swimming, fishing, picnicking, and sightseeing. For these uses, there are available within the basin four large reservoirs of 1,000 acres or more, 35 ponds containing 5 acres or more, approximately 2,580 small ponds under 5 acres in size, and numerous miles of streams having sustained flow the year round.

Although it is difficult to quantitatively express the actual amount of recreational use of all the surface streams in the entire basin, some data is available from the Tennessee Valley Authority for Chickamauga Lake. The annual recreational use of this reservoir is estimated to be approximately 5,745,000 man-day visits. Although this amount of use is considered to be much less for the minor tributary streams in the basin, water oriented recreation is considered to be an important overall use of all the surface streams.

The majority of streams within the basin have been classified for recreation except for: Tennessee River mile 448.0 to mile 460.6; Lookout Creek from its mouth to the Georgia-Tennessee state line; Citico Creek from its mouth to origin; South Chickamauga Creek, West Chickamauga Creek, and Spring Creek from mouth to

Georgia-Tennessee state line; Friar Branch and Royall Springs Branch from mouth to origin; South Mouse Creek from mouth to mile 18.8; and limited sections of certain streams immediately below sewage treatment plant outfalls. These exceptions were allowed by the Water Quality Control Board to prevent water contact recreation where the possibility of pathogenic organisms being present was great. This exception is in no way intended to exempt sewage treatment plants from the requirement of adequate disinfection of their effluents, but rather is an added safety precaution which was deemed necessary because of the lack of knowledge concerning the effectiveness of chlorination upon viruses.

Livestock Water and Wildlife

Disaggregation by area of data from the 1976 Annual Bulletin of Tennessee Agricultural Statistics indicates that there are 156,725 cattle and calves, and 18,575 hogs in the basin. In addition, there are sheep, lambs and goats, horses and ponies within the area but numbers were not reported in the Bulletin by county. Practically all these animals obtain their water from either natural streams or ponds. Maintenance of water quality to meet the requirements of livestock watering is vital to protect this valuable asset in the basin.

Wildlife is abundant in the basin and provides the outdoor enthusiast and hunter a great deal of recreational opportunity. Large game animals and waterfowl make frequent use of the larger streams and ponds, and numerous kinds of smaller wildlife use the streams of the basin either as a source of water or as part of their natural habitat. All streams within the Lower Tennessee River Basin have been designated for livestock watering and wildlife, except Citico Creek, Burra-Burra Creek, Davis Mill Branch, and East Acid Branch.

Irrigation

It is estimated that in 1964 there were about 45 irrigation systems in operation in the Lower Tennessee River Basin. In the following decade there was a 67 percent decrease in the number of systems; only 15 were reported in use in 1974. The primary reasons for this decline is believed to be due to the absence of extended drought periods during recent years and the labor costs associated with irrigation systems. Presently, only 50 acres of farmland are being irrigated in the basin.

Although irrigation presently represents a minor volume use of water in the basin, during drought perods, when stream flows are low, irrigation can become a vital need to save crops. Therefore, all streams, except Citico Creek and those stream sections contained within private boundaries, which have a sustained flow are classified for irrigation use.

Navigation

The U. S. Corps of Engineers has the responsibility of maintaining navigation in the navigable waters of the State. A public notice, listing those tributary streams in the Tennessee Valley which are considered navigable, was issued by the Corps in 1965. The Tennessee Water Quality Control Board has followed this listing in establishing the navigation classification. Those stream sections classified for navigation are: Tennessee River mile 416.5 to mile 499.4; Sequatchie River from mouth to mile 3.5; and the Hiwassee River from mouth to mile 23.9.

Table III-1 lists all known dischargers to each segment and the maximum stream loads for each segment. This term refers to the maximum quantity of a particular pollutant (usually expressed in pounds) that the stream segment can assimilate without causing a violation of stream standards. The calculation of the maximum load must account for a number of factors including the nature of the pollutant, background concentrations of the pollutant in the stream, the quantity of streamflow, the physical character of the stream, the quantity of flow from the dischargers, and others. Because many of these factors cannot be adequately evaluated at the present and are subject to change with time, a maximum allowable waste load expressed in pounds is not always the most practicable method for controlling pollution in a segment. In particular, for those segments where discharger flow may represent a significant portion of total streamflow, better control of a particular pollutant may be achieved through limits of effluent concentrations. Thus, effluent concentration (in addition to allowable pounds) loading is listed for dischargers to all stream segments. The background information used to determine the maximum allowable wasteloads is given in Appendix C. Chapters IV and V discuss the significant discharges (i.e. industrial, municipal and other domestic discharges) in considerable detail.

Within the Lower Tennessee River Basin lies Chattanooga, one of the four major metropolitan areas in Tennessee. Due to high population density and industrial development, many water quality problems exist in the Chattanooga area. There are also several other areas of high population and/or industrial and mining development in the basin which have significant water quality degradation.

Outside of these problem areas, the water quality in the Lower Tennessee River Basin is good. There are few known naturally occurring pollution problems in the Basin, and except for moderately high concentrations of iron and manganese in some streams, and low pH in a few springs in the Unicoi Mountain Region, the low natural concentration of minerals in the basin's waters present no great problems in obtaining domestic and industrial water supplies.

The surface waters of the basin support a wide variety of fish and other aquatic life, and provide for the growth and propagation of these species. Water contact recreation is a recognized use of the streams in the basin, and all are classifed for this use, except for (1) limited segments below certain waste treatment outfalls and (2) stream segments with chronic water quality problems created by the long-term multiplicity of waste discharges.

The most extensive degradation of water quality in the basin exists in the Chattanooga area. Citico Creek and Chattanooga Creek (and tributaries) are grossly polluted by combined sewers, urban runoff, and a multiplicity of industrial discharges, which cause low dissolved oxygen (DO), extreme pH values, high solids, oils, metals, and phenols in the water of these streams. In addition to many industrial discharges (including C F Industries, a large fertilizer plant), South Chickamauga Creek (and tributaries) has several large domestic wastewater treatment outfalls (including Brainerd and East Ridge) which currently cause violations of water quality standards. Low DO, extreme pH, and excessive coliform ammonia, nitrates, and metals characterize the water of this stream. Citico Creek, Chattanooga Creek, and South Chickamauga Creek also receive much polluted flow in the form of pavement runoff and bypassed waste from overloaded sewers.

All three of these streams flow into the Nickajack Reservoir backwater of the Tennessee River below Chickamauga Dam. This segment of the Tennessee River receives waste flow from numerous industries (especially cooling water discharges), several major domestic treatment plants (Moccasin Bend, Red Bank and Signal Mountain), and from pavement runoff and sewer bypasses, resulting in DO, coliform, and temperature standards violations. Finally, most of the flow in the Tennessee River below Chickamauga Dam comes from the lower depths of Chickamauga Lake, after having been used by the Tennessee Valley Authority to generate electric power. This water has the low DO characteristic of the lower depth of large reservoirs.

The Tennessee American Water Company which serves approximately a quarter of a million people in the Chattanooga area, takes its raw water from the Tennessee River, mile 485.5. Since 1960, rapid industrialization upstream of the intake has resulted in frequent taste and odor problems in the finished water supply. Numerous spills of wastewater and hazardous materials in the vicinity have also been documented.

In 1972 the Commissioner of the Tennessee Department of Public Health established a task force to study this situation. The task force recommended that existing pollution laws be strictly enforced, that the Tennessee Valley Authority consider flow regulation to minimize the problem, that zoning requests and building permits be reviewed carefully to prevent further adverse effects due to development, and that the Company be required to make a complete study of the problem. In 1973, the Commissioner issued a complaint and order to the Company requiring a study to investigate inplant control measures, intake location, waste spill warning systems, and the feasibility of additional storage facilities for use during spill episodes. This report was finalized in 1976.

Based on the company's study and other data available, the Commissioner ordered certain treatment modifications, removal of the intake to a location near midstream, and construction of additional storage facilities. In June of 1977 this order was amended, delaying the moving of the intake for one year from the date of completion of carbon filtration, early warning system, and additional carbon feeding facilities. Another study to determine the effectiveness of these modifications was also ordered.

The Chattanooga Area 208 Plan proposes, in its continuing planning process, to inventory potential spill sites, establish a spill prevention program, and investigate an industrial growth policy to preclude the potential for future industrial spills. The Division of Water Quality Control will also continue to closely observe the situation.

The solution of the water quality problems in the Chattanooga area depends on optimal allocation of the available stream assimilative capacity to all dischargers, a viable program to control nonpoint pollution and industrial spills, and an adequate monitoring of waste discharges and prompt enforcement of effluent standards. The City of Chattanooga must also implement and enforce a comprehensive industrial sewer use ordinance. All municipalities operating sewage systems must correct excessive inflow and infiltrations and adequate control of residual wastes must be instituted. The Division of Water Quality Control is unable to provide sufficient manpower and resources to adequately manage water quality in the Chattanooga area. This situation is further exacerbated by the continual increase in population in the number of new industrial discharges created in the Chattanooga area each year.

Volunteer Army Ammunition Plant (VAAP) has discharged large quantities of industrial waste to Waconda Bay, an arm of Chickamauga Lake. This discharge contains excessive color, metals, ammonia, and nitrates, and varies rapidly in pH from highly acidic to highly alkaline. The deactivation of the plant and its

Little North Mouse Creek receives the effluent from Niota, including three textile mills. Treatment at these facilities must be upgraded to meet stream standards in the creek. Candies Creek, Greasy Creek, Blue Springs Branch, Spring Creek. and Kinser Creek. all have had excessive BOD and coliform due to discharges from various package treatment plants. Several of these treatment plants have recently been upgraded to tertiary level treatment, and proper operation should prevent further violation of stream standards. The Candies Creek Sanitation District must correct infiltration before its plant will function satisfactorily.

The Lower Tennessee Basin has two major Tennessee Valley Authority main river projects. Chickamauga Dam, built in 1936 impounds the Tennessee River at TRM 471.0, and Nickajack Dam, built in 1964 to replace Hales Bar Dam, impounds the Tennessee at TRM 424.7.

Chickamauga Reservoir is generally considered to have good water quality; however, the water quality standard for dissolved oxygen has been violated at numerous stations in the reservoir. The low dissolved oxygen concentrations in the waters of Chickamauga Reservoir result from hypolimnetic releases from Watts Bar Reservoir. This dense, low dissolved oxygen content water from Watts Bar Reservoir begins to flow under the warmer waters of Chickamauga Reservoir at approximately TRM 510.0. Dissolved oxygen levels in the hypolimnion during summer months usually equals 5 mg/l depending on the degree of vertical mixing which occurs throughout the season. Surface water dissolved oxygen concentrations generally range from 5 to 8 mg/l in the upstream section to 9 to 11 mg/l in the reservoir near the dam. Median values throughout the reservoir vary from approximately 7 to 9 mg/l. Releases of water from Chickamauga Reservoir to Nickajack have an average dissolved oxygen concentration of 8.23 mg/l while the minimum concentration has been 3.2 mg/l.

There are 11 municipal and industrial waste discharges to Chickamauga Reservoir and its tributaries. The most significant of these is the Volunteer Army Ammunition Plant which discharges large quantities of industrial waste to Waconda Bay.

In summary, the quality of water in Chickamauga Reservoir is relatively good. The major water quality problem which does exist is low dissolved oxygen concentrations resulting from the upstream discharges from Watts Bar Dam. However, there also exists the potential for the alteration of water quality in Chickamauga Reservoir by the discharges from two nuclear power plants, Sequoyah and Watts Bar, now under construction by TVA.

In contrast to Chickamauga Reservoir, which has relatively good water quality, the Chattanooga area of Nickajack Reservoir is considered by the Tennessee Department of Public Health to be the most severely degraded waterway in the Lower Tennessee River Basin. Nickajack Reservoir begins in the extreme northwest corner of Chattanooga and flows through the heart of the city. As discussed earlier, the most polluted streams in the study area are South Chickamauga, Citico and Chattanooga Creeks. These streams receive discharges from numerous industrial and municipal wastewater systems. All three of these streams flow into Nickajack backwater of the Tennessee River below Chickamauga Dam. This segment of the Tennessee River directly receives waste flow from numerous industries (especially cooling water discharges), several major domestic treatment plants (Moccasin Bend, Red Bank, and Signal Mountain), and from pavement runoff and sewer bypass, resulting in DO and coliform standard violations. Finally, most of the flow in the Tennessee River below Chickamauga

APPENDIX B

STREAM USE CLASSIFICATION FOR THE LOWER TENNESSEE RIVER BASIN

(INCLUDING CONASAUGA BASIN)

Appendix B

Stream Use Classification for the Lower Tennessee River Basin
(Including Conasauga Basin)

STREAM	DESCRIPTION	DOM	IND	FISH	REC	IRR	LW&W	NAV
Tennessee River	Tenn-Ala State Line (Mile 416.5) to The POT Light (Mile 448.0)	X	X	X	X	X	X	X
Unnamed Tributary	At Tenn. River Mile 417.5; Mile 0.0 to Origin			X		X	X	
Battle Creek	Mile 0.0 to Origin	X	X	X	X	X	X	
Big Fiery Gizzard	Mile 0.0 to Origin			X	X	X	X	
Little Fiery Gizzard	Mile 0.0 to Origin			X	X	X	X	
Unnamed Tributary	At Little Fiery Gizzard Mile 0.6; Mile 0.0 to Origin			X		X	X	
Sequatchie River	Mile 0.0 to 3.5	X	X	X	X	X	X	X
Sequatchie River	Mile 3.5 to 41.0	X	X	X	X	X	X	
Sequatchie River	Mile 41.0 to 43.9			X		X	X	
Sequatchie River	Mile 43.9 to 74.0	X	X	X	X	X	X	
Sequatchie River	Mile 74.0 to 77.0			X		X	X	
Sequatchie River	Mile 77.0 to Origin	X	X	X	X	X	X	
Coops Creek	Mile 0.0 to 0.3			X		X	X	
Coops Creek	Mile 0.3 to Origin			X	X	X	X	
Tennessee River	Mile 448.0 to 460.0 (Chattanooga Creek)		X	X		X	X	X
Shoal Creek	Mile 0.0 to Origin			X	X	X	X	
Unnamed Tributary	At Tenn. River Mile 455.6; Mile 0.0 to 0.3			X		X	X	
Unnamed Tributary	Mile 0.3 to Origin			X	X	X	X	
Unnamed Tributary	At Tenn. River Mile 458.7; Mile 0.0 to Origin			X	X	X	X	
Lookout Creek	Mile 0.0 to Georgia-Tenn State Line		X	X		X	X	
Black Creek	Mile 0.0 to 1.6			X		X	X	
Black Creek	Mile 1.6 to Origin			X	X	X	X	
Chattanooga Creek	Mile 0.0 to Georgia-Tenn State Line		X	X		X	X	
Tennessee River	Mile 460.6 to 499.4 (Hiwassee)	X	X	X	X	X	X	X
Citico Creek	Mile 0.0 to Origin			X				
South Chickamauga Creek	Mile 0.0 to Georgia-Tenn State Line		X	X		X	X	
Friar Branch	Mile 0.0 to Origin			X		X	X	

9. Taste or Odor- There shall be no substances added which will result in taste or odor that prevent the production of potable water by conventional water treatment processes.

10. Toxic Substances- There shall be no toxic substances added, whether alone or in combination with other substances, to the water which will produce toxic conditions that materially affect the health and safety of man or animals, or impair the safety of conventionally treated water supplies. Available references to be used in determining such conditions shall include, but not be limited to; Quality Criteria For Water (Section 304(a) of PL 92-500); Federal Regulations under Section 307 of PL 92-500; and Federal Regulations under Section 1412 of the Public Health Service Act as amended by the Safe Drinking Water Act (PL 93-523).

11. Other Pollutants- Other pollutants shall not be added to the water in quantities that may be detrimental to public health or impair the usefulness of the water as a source of domestic water supply.

(b) Industrial Water Supply

1. Dissolved Oxygen- There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

2. pH- The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

3. Hardness or Mineral Compounds- There shall be no substances added to the waters that will increase the hardness or mineral content of the waters to such an extent to appreciably impair the usefulness of the water as a source of industrial water supply.

4. Total Dissolved Solids- The total dissolved solids shall at no time exceed 500 mg/l.

5. Solids, Floating Materials and Deposits- There shall be no distinctly visible solids, scum, foam, oily sleek, or the formation of slimes, bottom deposits or sludge banks of such size or character as may impair the usefulness of the water as a source of industrial water supply.

6. Turbidity or Color- There shall be no turbidity or color added in amounts or characteristics that cannot be reduced to acceptable concentrations by conventional water treatment processes.

7. Temperature- The maximum water temperature change shall not exceed 3C^{o} relative to an upstream control point. The temperature of the water shall not exceed 30.5^{o}C and the maximum rate of change shall not exceed 2C^{o} per hour. The temperature of impoundments where stratification occurs will be measured at a depth of 5 feet, or mid-depth whichever is less, and the temperature in flowing streams shall be measured at mid-depth.

8. Taste or Odor- There shall be no substances added that will result in taste or odor that would prevent the use of the water for industrial processing.

9. Toxic Substances- There will be no toxic substances added, whether alone or in combination with other substances, to the water which will adversely affect industrial processing.

10. Other Pollutants-Other pollutants shall not be added to the waters in quantities that may adversely affect the water for industrial processing.

(c) Fish and Aquatic Life

1. Dissolved Oxygen- The dissolved oxygen shall be a minimum of 5.0 mg/l except in limited sections of streams where it can be clearly demonstrated that (i) the existing quality of the water due to irretrievable man-induced conditions cannot be restored to the desired minimum of 5.0 mg/l dissolved oxygen; (ii) the cost for application of effluent limitations more stringent than those defined through Section 301 (b) of the Federal Water Pollution Control Act (PL 92-500) is economically prohibitive when compared with the benefits to be obtained; or (iii) the natural background quality of the water is less than the desired minimum of 5.0 mg/l. Such exceptions shall be determined on an individual basis, but in no instance shall the dissolved oxygen concentration be less than 3.0 mg/l. The dissolved oxygen concentrations shall be measured at mid-depth in waters having a total depth of ten (10) feet or less, and at a depth of five (5) feet in waters having a total depth of greater than ten (10) feet. The dissolved oxygen concentration of recognized trout streams shall not be less than 6.0 mg/l.

2. pH- The pH value shall lie within the range of 6.5 to 8.5 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

8. Other Pollutants- Other pollutants shall not be added to the waters that will be detrimental to fish or aquatic life.

9. Coliform- The concentration of the fecal coliform group shall not exceed 1,000 per 100 ml. as a geometric mean based on a minimum of 10 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purposes of determining the geometric mean, individual samples having a fecal coliform group concentration of less than 1 per 100 ml. shall be considered as having a concentration of 1 per 100 ml. In addition, the concentration of the fecal coliform group in any individual sample shall not exceed 5,000 per 100 ml.

(d) <u>Recreation</u>

1. Dissolved Oxygen- There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

2. pH- The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

3. Solids, Floating Materials and Deposits- There shall be no distinctly visible solids, scum, foam, oily sleek, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to recreation.

4. Turbidity or Color- There shall be no turbidity or color added in such amounts or character that will result in any objectional appearance to the water.

5. Temperature- The maximum water temperature change shall not exceed 3C^{o} relative to an upstream control point. The temperature of the water shall not exceed 30.5^{o}C and the maximum rate of change shall not exceed 2C^{o} per hour. The temperature of impoundments where stratification occurs will be measured at a depth of 5 feet, or mid-depth whichever is less, and the temperature in flowing streams shall be measured at mid-depth.

6. Coliform-The concentration of a fecal coliform group shall not exceed 200 per 100 ml. as a geometric mean based on a minimum of 10 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purposes of determining the geometric mean,

individual samples having a fecal coliform group concentration of less than 1 per 100 ml. shall be considered as having a concentration of 1 per 100 ml. In addition, the concentration of the fecal coliform group in any individual sample shall not exceed 1,000 per 100 ml. Water areas in the vicinity of domestic wastewater treatment plant outfalls are not considered suitable for body contact recreational purposes .

7. Taste or Odor- There shall be no substances added that will result in objectionable taste or odor.

8. Toxic Substances- There shall be no toxic substances added, whether alone or in combination with other substances, that will render the waters unsafe or unsuitable for water contact activities, or will propose toxic conditions that will adversely affect man or animal.

9. Other Pollutants-Other pollutants shall not be added to the water in quantities which may have a detrimental effect on recreation.

(e) Irrigation

1. Dissolved Oxygen- There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

2. pH- The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

3. Hardness or Mineral Compounds- There shall be no substances added to the water that will increase the mineral content to such an extent as to impair its use for irrigation.

4. Solids, Floating Materials and Deposits- There shall be no distinctly visible solids, scum, foam, oily sleek, or the formation of slimes, bottom deposits or sludge banks of such size or character as may impair the usefulness of the water for irrigation purposes.

5. Temperature- The temperature of the water shall not be raised or lowered to such an extent as to interfere with its use for irrigation purposes.

6. Toxic Substances- There shall be no toxic substances added, whether alone or in combination with other substances, to the waters which will produce toxic conditions that adversely affect the quality of the waters for irrigation.

7. Other Pollutants- Other pollutants shall not be added to the water in quantities which may be detrimental to the waters used for irrigation.

(f) Livestock Watering and Wildlife

1. Dissolved Oxygen- There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

2. pH- The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

3. Hardness or Mineral Compounds- There shall be no substances added to the water that will increase the mineral content to such an extent as to impair its use for livestock watering and wildlife.

4. Solids, Floating Materials and Deposits- There shall be no distinctly visible solids, scum, foam, oily sleek, or the formation of slimes, bottom deposits or sludge banks of such size or character as to interfere with livestock watering and wildlife.

5. Temperature- The temperature of the water shall not be raised or lowered to such an extent as to interfere with its use for livestock watering and wildlife.

6. Toxic Substances- There shall be no substances added, whether alone or in combination with other substances, to the waters which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife.

7. Other Pollutants- Other pollutants shall not be added to the water in quantities which may be detrimental to the water for livestock watering and wildlife.

(g) Navigation

1. Dissolved Oxygen- There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

2. Hardness or Mineral Compounds- There shall be no substances added to the water that will increase the mineral content to such an extent as to impair its use for navigation.

Site No. TND 003327251

Reference No. 15

SURVEY OF CHATTANOOGA CREEK--MOUTH TO STATE LINE
AQUATIC FLESH, WATER QUALITY, SEDIMENT, AND BENTHIC BIOLOGY
WITH
DATA PRESENTATION ON HAMILL ROAD DUMP
CHATTANOOGA, TENNESSEE

1981 and 1982

PREPARED BY:
CHATTANOOGA BASIN OFFICE OF
DIVISION OF WATER MANAGEMENT
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

JUNE 1983

AUTHORIZATION NO. 0890

Consistent with the above constraints, the study was planned to provide quick information on the human exposure potential from eating aquatic flesh from Chattanooga Creek. As laid out, it was not an attempt to provide a comprehensive study of all possible bioaccumulation systems in the Creek and its connecting waterways. If a human health threat from this pathway existed, the study was comprehensive enough to detect it, and, should such a detection occur, it was planned that the public would immediately be notified, following which a more comprehensive survey of contamination of aquatic organisms to define origins and specific routes of movement of pollutants through the food chains would be devised and carried out. Since the results of the study did not indicate a significant human health threat, the subsequent more detailed work of this nature was not performed. However, the biological assessment study of the stream, as presented in Section IV of this report, was designed to include an additional look at the health of the aquatic population in the creek in relation to contact with the toxic materials.

Description of Study Area

At its mouth, Chattanooga Creek drains in an area of approximately 74.7 square miles in the States of Tennessee and Georgia (Reference No. 10). Approximately twenty percent of this area lies north of the state line in Tennessee. The head waters of the stream are located on Lookout Mountain at approximate elevation 1,966 feet mean sea level (msl) with the elevation at the mouth of the stream being approximately 634 msl. The majority of the drainage area encompasses the northern end of Chattanooga Valley between Lookout Mountain and Missionary Ridge in North Georgia, but a significant portion of the drainage is taken from the Cumberland Plateau area of Lookout Mountain via Long Branch and Rock Creeks, which are tributaries to the stream just north of Flintstone, Georgia. A detailed description of the topography and geology of the stream may be found in Section IV of this report.

The drainage area of Chattanooga Creek in Tennessee may be classified as urban and industrial, with virtually all of the area, except for that lying on the flank of Lookout Mountain, being within the City of Chattanooga and devoted to various urban usages. However, the flood plain of Chattanooga Creek within the City still contains significant amounts of woodland. The majority of the drainage area in Georgia may be classified as either forest or agricultural lands, but perhaps twenty percent of the stream's total drainage area lying just south of the state line, and including the City of Rossville, Georgia, may also be considered as "urban built up" (Reference No. 11).

The portion of the drainage basin occupied by forest would not normally be expected to contribute significant pollution to the stream. However, the potential for non-point source pollution from agriculture does exist, and the Chattanooga 208 Waste Management Plan documented seven agricultural operations (all in Walker County, Georgia), consisting of poultry (four), swine (two), and dairy (one) which were considered sources of rural non-point pollution into the Chattanooga Creek drainage system (Reference No. 11). By far, however, the largest contribution of pollution to Chattanooga Creek is from the urban, industrial, and suburban portions of the drainage basin which occupy approximately the northern thirty percent of the total area. Within this area, the major sources to be expected to contribute are industrial point source discharges and yard drainage, domestic sewage discharges and by-passes, dump drainages, septic reported to be closed by the City, but other sources of leakage and discharge from the municipal sewage system to the streams have been found from time to time. Table III provides a listing of the known sewage discharges from the City of Chattanooga system into these streams. In Georgia, the Chattanooga 208 report listed a number of institutions having discharges of domestic wastewater from small sewage treatment plants into Chattanooga Creek. It is expected that overflow points from the Rossville sewage system are also found in the McFarland Branch drainage basin. In addition to outlets from the sanitary and combined sewer systems, it is known that a number of storm sewers in Chattanooga are contaminated with domestic sewage, probably from illegal sanitary connections. The same situation may exist in North Georgia.

Dump drainage into Chattanooga Creek and its tributaries is a significant factor contributing to water pollution. The Chattanooga 208 plan inventoried active dump sites within the drainage basin and listed the Alton Park and 38th Street dumps in Tennessee and the Rossville dump in Georgia. However, many other old dump sites operated by city and county governments and illicit dump sites used by both industries and private citizens occur at regular intervals along the flood plain of the lower portion of Chattanooga Creek. A complete listing of these is not available, but known locations are discussed in more detail in Section III of this report. The Chattanooga 208 report also surveyed residual waste types produced by the industrial community operating in the Chattanooga area, along with existing disposal modes. Approximately half of the industries indicated that their residuals were "hauled off-site", with no specific destination given.*

Description of Sampling Stations

Figure III provides a map showing the locations of the four stations where aquatic flesh samples were taken for this study. In arriving at these locations, the known sources of pollution to the creek, as discussed above and in Section I of this report, were taken into consideration, along with locations where it was known that a significant amount of fishing was taking place. The sampling stations were intended to be reaches of stream of up to three quarters of a mile in length along which aquatic organisms would be collected for analyses. The four stations selected represent areas of different contamination types and potentials, giving a fair coverage to all reaches of the creek and considering public access points. The stream mileages covered by the four stations are: Station A - mile 6.0 to 6.3; Station B - mile 3.6 to 4.0; Station C - mile 1.8 to 2.2; and Section D - mile 0.2 to 1.0.

Station A was located where Chattanooga Creek has been channeled through an old borrow pit and is a site that was known to be very heavily used by local fishermen. A number of fishermen encountered during the sampling advised that they regularly fished there and ate the fish. This location is downstream of all pollution sources in Georgia except those originating in Rossville (McFarland Branch). (See Section III for a discussion of flow patterns in this area.) The

* Industrial residuals management practices are now being better inventoried under the requirements of the Tennessee Solid and Hazardous Waste Management Laws and the Federal Rsource Conservation and Recovery Act (RCRA), but no comprehensive tabulation of this information for the Chattanooga area is yet available.

APR 13 1981

TENNESSEE TOXICS PROGRAM

P.O. BOX 1422, NASHVILLE, TN 37202 • (615) 251-1110

Press Release 4/13/81

Subject: survey of school Childrens' use of Chattanooga Creek

The Chattanooga Task Force of the Tennessee Toxics Program has completed a survey which shows that a considerable number of school children play, swim, and fish in contaminated Chattanooga Creek. The cooperation of city schools in Alton Park was obtained to conduct a survey of 5th, 6th, and 7th graders. The students filled out Task Force questionnaires under the supervision of their teachers.

A tabulation of the responses of a total of 232 students, 84% of whom live within 10 blocks of the Creek, showed that:

- 6% swim in the creek;
- 11% play in the creek;
- 13% fish in the creek; and
- 6% have eaten fish from the creek.

Larger percentages of the students said they had friends who swim in the creek, fish there, and eat the fish. The youngest group sampled, the 5th graders, indicated the greatest use of the creek:

- 9% swim in the creek;
- 20% play in the creek;
- 23% fish in the creek; and
- 8% have eaten fish from the creek.

The majority of the students rated the creek as "smelly" and "irritating," however, a significant number still thought the creek was "fun".

For more information, contact:

Mary M. Walker
Coordinator, Chattanooga
Task Force
1607 Shore View Lane
Chattanooga, Tn. 37443
phone: 875-2400

March 25, 1981

To The Teachers:

This is a sampling survey to determine to what extent Chattanooga Creek is being used by some of the nearby residents. We have included a map for your use in assisting students locating creek areas. Please distribute and then collect the questionnaires and return them to your principal.

Thank you for your help.

This survey is being made by an interested citizens group cooperating with an agency of the state of Tennessee. The Chattanooga school system has agreed to permit this survey to be taken.

Date 3-25-81

CHATTANOOGA CREEK

Please Circle One Answer To These Questions:

		YES	NO
1.	Do you ever swim in the creek?		
2.	Have any of your friends used the creek for swimming?		
3.	Do you ever fish in the creek?		
4.	Have any of your friends fished in the creek?		
5.	Have you eaten any fish from the creek?		
6.	Have any of your friends eaten fish from the creek?		
7.	Do you play in the creek?		
8.	Do any of your friends play in the creek.		
9.	Have you seen any boating, canoeing etc. in the creek?		
10.	If you don't use the creek, why not?		

Please Circle All Words That Fit:

1. I think the creek is fun, pretty, smelly, clean, irritating.
2. I live near the creek - 1 block, 2-3 blocks, 5 blocks, 5-10 blocks

THANK YOU VERY MUCH FOR YOUR HELP.

OVERSIZED

DOCUMENT

Potential Hazardous Waste Site

Site Inspection Report

D.M. Steward Manufacturing Company

TND003327251

Chattanooga, Hamilton County, Tennessee

Preliminary Site Inspection Report
D. M. Steward Manufacturing Company
TND003327251

On October 17, 1985, a site inspection was conducted at D. M. Steward Manufacturing Company in Chattanooga, Hamilton County, Tennessee. Conducting the inspection for the State of Tennessee were Walker Howell, Janet Eldridge, and Gordon Caruthers. Representing D. M. Steward Company were John Woody, Marketing Engineer, David Holt, Plant Engineer, and Riley Castelberry, Maintenance Supervisor. During the course of the inspection, two grab soil samples, one composit soil sample, one duplicate soil sample, and one water sample were collected. These samples will be analyzed for barium, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc. A laboratory report outlining the analytical results is expected from the state environmental lab on or about December 1, 1985. Samples were split with D. M. Steward Company.

GSC/svw 1-4

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 00327251

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
D.M. Steward Manufacturing Co.	East side of Jerome St. between 36th & 37th St.

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Chattanooga	TN	37401	Hamilton	033	03

09 COORDINATES: LATITUDE 35 00 03 · LONGITUDE 85 17 53

10 TYPE OF OWNERSHIP (Check one): X A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
10 17 85 (MONTH DAY YEAR)	X ACTIVE ☐ INACTIVE	1888 (BEGINNING YEAR) / present (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ________ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ________ (Name of firm)

X E. STATE ☐ F. STATE CONTRACTOR ________ (Name of firm) ☐ G. OTHER ________ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Walker Howell	Geologist II	DSWM	(615) 741-6287
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO.**
Jan Eldridge	Geologist II	DSWM	(615 741-6287
Gordon Caruthers	Environmental Specialist	DSWM	(615 741-6287
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
John Woody	Marketing Eng.	E. 36th St./Chattanooga	(615) 867-4100
David Holt	Plant Engineer	E. 36th St./Chattanooga	(615) 867-4100
Riley Castleberry	Maintenance Supervisor	E. 36th St./Chattanooga	(615) 867-4100
			( )
			( )
			( )

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17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
X PERMISSION ☐ WARRANT	9:15 a.m. EST	Sunny, partly cloudy, 75°F

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
John Woody	D.M. Steward Manufacturing Co.	(615) 867-4100

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Walker F. Howell	TDHE	DSWM	615-741-6287	11 1 85

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- X A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER ______ (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS ______
- CUBIC YARDS unknown
- NO. OF DRUMS ______

03 WASTE CHARACTERISTICS (Check all that apply)

- X A. TOXIC
- ☐ B. CORROSIVE
- X C. RADIOACTIVE
- X D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

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III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	unknown	---	Heavy metals contained in ceramic waste products.

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
MES	Barium Oxide	B04-28-5	LF, SI	unknown	------
MES	Nickel	7440-02-0	LF,SI	unknown	
MES	Zinc	7440-66-6	LF,SI	unknown	

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V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site inspection, D.M. Steward Manufacturing Co, October 17, 1985

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

EPA

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 003327251

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 X A. GROUNDWATER CONTAMINATION — 02 X OBSERVED (DATE 10/17/85) — X POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____
04 NARRATIVE DESCRIPTION

A surface impoundment (abandoned) and an adjacent dump adjoin a low swampy area indicative of groundwater resurgence.

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01 X B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE ____) — X POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown
04 NARRATIVE DESCRIPTION

A surface impound lying adjacent to a wet, swampy area was used for disposal of filter waste.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE ____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____
04 NARRATIVE DESCRIPTION

N/A

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE ____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____
04 NARRATIVE DESCRIPTION

N/A

01 X E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE ____) — X POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 9621
04 NARRATIVE DESCRIPTION

There are no security guards or fencing around site. The site is also bounded on three sides by residential areas. Population cited is an estimated of that within a one mile radius of the site.

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE ____) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ____ (Acres)
04 NARRATIVE DESCRIPTION

N/A

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE ____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____
04 NARRATIVE DESCRIPTION

N/A

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01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE ____) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ____
04 NARRATIVE DESCRIPTION

N/A

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE ____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____
04 NARRATIVE DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: D 003327251

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

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01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (include name(s) of species)

N/A

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 X M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 X OBSERVED (DATE: 1/25/84) X POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

Blue crystalline material has been observed to be on the surface of the impoundment near a spring.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

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III. TOTAL POPULATION POTENTIALLY AFFECTED: 9621

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site Inspection, D.M. Steward Manufacturing Co, October 17, 1985, Site Investigation Program

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
X A. NPDES				
☐ B. UIC				
X C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

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III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
X A. SURFACE IMPOUNDMENT	unknown	
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
X F. LANDFILL	unknown	
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- X C. CHEMICAL/PHYSICAL
- X D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- X A. BUILDINGS ON SITE

0.75

06 AREA OF SITE

(Acres)

07 COMMENTS

A pond existed at one time adjacent to Jerome Street and was used as a settling basin for removal of solids from wastewater discharge. Approximately 5-10 years ago, D.M. Steward hooked into a pretreatment system which eliminated the need for this facility. The pond sits next to a low swampy area which apparently drains subsurfacely.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE X C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

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V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: X YES ☐ NO

02 COMMENTS

The surface impoundment lies adjacent to Jerome Street and 37th Street.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

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EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ☒	B. ☐
NON-COMMUNITY	C. ☐	D. ☐

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. ______ (mi)
B. ______ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER None

03 DISTANCE TO NEAREST DRINKING WATER WELL ---- (mi)

04 DEPTH TO GROUNDWATER 0-2 (ft)

05 DIRECTION OF GROUNDWATER FLOW S-SE

06 DEPTH TO AQUIFER OF CONCERN ______ (ft)

07 POTENTIAL YIELD OF AQUIFER ______ (gpd)

08 SOLE SOURCE AQUIFER ☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including usage, depth, and location relative to population and buildings)

State records indicate no domestic water wells exist in immediate area.

10 RECHARGE AREA
☐ YES ☐ NO
COMMENTS

11 DISCHARGE AREA
☒ YES ☐ NO
COMMENTS The site has a spring which resurges here.

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☒ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME	AFFECTED	DISTANCE TO SITE
Chattanooga Creek	☐	0.30 (mi)
	☐	(mi)
	☐	(mi)

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V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE A. 9621 NO. OF PERSONS
TWO (2) MILES OF SITE B. ______ NO. OF PERSONS
THREE (3) MILES OF SITE C. ______ NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 0.02 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE ______

04 DISTANCE TO NEAREST OFF-SITE BUILDING 0.02 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The site is bounded on three sides by residential areas, with approximately 9621 people within one mile of the facility. This is indicative of a fairly dense suburban area.

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

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VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec X B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) X B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
-5 (ft)	unknown (ft)	-----

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
14.0 (in)	3.25 (in)	0.5 %	West	1.0 %

09 FLOOD POTENTIAL	10
SITE IS IN 100 YEAR FLOODPLAIN	☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)	12 DISTANCE TO CRITICAL HABITAT (of endangered species)
ESTUARINE A. ______ (mi) N/A OTHER B. ______ (mi)	______ (mi) ENDANGERED SPECIES: ______

13 LAND USE IN VICINITY

DISTANCE TO

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS, NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A 0.05 (mi)	B 0.02 (mi)	C ----- (mi)	D ------- (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site lies in a low, swampy area bounded on its south flank by 38th Street and on its west side by Jerome Street. Apparently, drainage from the swamp is subsurface. A spring resurges on site and heads up this body of water.

DRAFT

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

United States Dept. of Agriculture, Soil Conservation Service, Soil Survey of Hamilton County Tennessee, May 1982. A users Manual Uncontrolled Hazardous Waste Ranking System, USEPA, 1984 U.S. Geological Survey, Topographic Map, Chattanooga Quadrangle, (105SE), 1976.

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER	1	State Laboratory in Nashville, TN	12/1/85
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL	3	State Laboratory in Nashville, TN	
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE X GROUND ☐ AERIAL

02 IN CUSTODY OF Site Investigations Program
(Name of organization or individual)

03 MAPS X YES ☐ NO

04 LOCATION OF MAPS Division of Solid Waste Mgt., Nashville Central Office

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

DRAFT

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site Inspection, D.M. Steward Mfg. Co., October 17, 1985, Site Investigations Program

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER
Hamilton Concrete Products	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
1400 East 39th Street	

05 CITY	06 STATE	07 ZIP CODE
Chattanooga,	TN	37407

(615)867-4510

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

DRAFT

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
D.M. Steward Mfg. Co.	

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE
E. 36th Street and Jerome St.	

05 CITY	06 STATE	07 ZIP CODE
Chattanooga	TN	3740±

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P O Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P O Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P O Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P O Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

IV. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

DRAFT

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
D.M. Steward Mfg. Co.			

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE
E. 36th Street and Jerome St.			

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
Chattanoogs	TN	37401			

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A			

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

DRAFT

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 003327251

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ F. WASTE REPACKAGED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ L. ENCAPSULATION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ N. CUTOFF WALLS — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

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POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ S. CAPPING/COVERING 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ T. BULK TANKAGE REPAIRED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
MN/A

01 ☐ 1. ACCESS TO SITE RESTRICTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
N/A

01 X 3. OTHER REMEDIAL ACTIVITIES 02 DATE ______ 03 AGENCY D.M. Steward
04 DESCRIPTION

DRAFT

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D 003327251

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

N/A

DRAFT

DRAFT

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Potential Hazardous Waste Site

PRELIMINARY ASSESSMENT

D.M. STEWARD MANUFACTURING COMPANY, INCORPORATED

TND 003327251

CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

D. M. STEWARD MANUFACTURING

TND 003327251

The D.M. Steward Manufacturing site is an approximately three acre landfill and dump in a low swampy area on the opposite site of a public street from the manufacturing facility. This site is located on the east side of Jerome Street between East 36th and East 38th Streets in Chattanooga in Hamilton County, Tennessee. The swampy area and a spring that resurges on the site constitute the headwaters of an unnamed tributary to Chattanooga Creek. This unnamed tributary enters Chattanooga Creek on the east bank at approximately creek mile 4.8.

A search of ownership records at the Hamilton County Office of the Assessor of Taxes and the Office of the Register of Deeds revealed that the property when the plant is located is described as Map 167D-F parcel 010. The owner is listed as:

Steward, D.M. Mfg. Co.
E. 36th Street
Chattanooga, TN 37407

The deed to this property is recorded in the Office of the Register of Deed in Book 1387 page 50.

The property which recevied wastes from D.M. Steward Manufacturing has been split between two corporate entities. The property directly across Jerome Street from the manufacturing facility and which definitely received wastes is described as Map 168A-N parcel 030. The owner is D. M. Steward Manufacturing Company.

The properties adjacent to parcel 30 to the east, which probably received wastes, are listed as numerous individual parcels and are owned by Hamilton Concrete Products.

This facility has had a long and diverse manufacturing history. The company has been active at this site since 1888. Presently a manufacturer of technical ceramic insulators and oriented ferrites (magnets), the plant in the past manufactured burner tips for gas lights originally and later produced pencils for slate boards and components for small electric motors.

The site in question, the swampy area across Jerome Street from the plant, was allegedly used as a dump by D.M. Steward Manufacturing at various times throughout its history. Prior to 1976, when the company initiated pretreatment and discharge of wastewater to the City of Chattanooga's Interceptor Sewer System, wastewater was discharged to this area also. A pond existed at one time adjacent to Jerome Street and was used as a settling basin for removal of solids from the wastewater. The nature of these solids is unknown but it is assumed that they were never removed from the bottom of the pond. The aforementioned spring is alleged to be contaminated and the discharge from it is pumped to the plant's pretreatment facility. It is not possible to estimate the amount of waste that may be present at this time. The site was apparently used for waste disposal from prior to 1900 until the mid-1970's.

This site presents several possible routes for off-site migration of contaminants. Due to the proximity of the site to Chattanooga Creek and the dominant low relief the potential for shallow watertable conditions exists. This is further indicated by the presence of a spring on the site. A thrust fault is located approximately 1/2 mile west of the site indicating the site is possibly underlain by highly fractured bedrock. These conditions illustrate a potential for contamination of both shallow and deeper water bearing zones.

Portions of this site are located within the 100 year floodplain of Chattanooga Creek. Material was deposited in a swampy area that is the headwater of an unnamed tributary to Chattanooga Creek. The discharge from the settling pond mentioned previously also contributed to the headwater of the unnamed tributary to Chattanooga Creek. The factors combined indicate that contamination of the unnamed tributary to Chattanooga Creek and Chattanooga Creek likely occurred in the past and could be occurring presently.

Another significant route of exposure is through direct contact. This site is located in a high population density mixed urban/industrial area. The site is not fenced or under the control of security guards.

The total population potentially affected by this site is estimated to be 9141 and is based primarily upon direct contact exposure. While the pollution of Chattanooga Creek is potential hazard, the Creek is not known to be used as a source of drinking water. Similarly, population exposure via groundwater is considered unlikely. State records of water wells indicated that no wells used for drinking water exist in the immediate area, however several industrial wells are in use. It must be noted, however, that state water well records are available starting in 1963. Prior to 1963 no reporting or record keeping was required. The area of Chattanooga in question is an older section and, while municipally supplied drinking water is available, the possibility of groundwater use through wells predating 1963 cannot be completely disregarded.

The total population estimate is based upon possible direct contact with the population within a one mile radius of the site. Based upon documentation supplied by the Chattanooga-Hamilton County Regional Planning Commission this one mile radius includes parts of four (4) census tracks. An estimate was made of the percent of the area of each census tract that is included in this one mile radius. The population of each tract, as determined by the 1980 census, was multiplied by the respective percentages and these figures totalled to arrive at the estimate cited.

While much information exists suggesting the deposition of wastes at this site there is a paucity of information regarding the specific nature of these wastes. Based upon the length of time that this site was active, the diversity of manufacturing processes used throughout the history of D.M. Steward Manufacturing, and the large population within a one mile radius of this site, it is recommended that this site be assigned a medium priority for site inspection.

MH/bec/3012 Program

Data Sources

1. Tax records - Office of Assessor of Taxes for Hamilton County, Tennessee.

2. Property deeds recorded at the Office of the Registrar of Deeds for Hamilton County, Tennessee.

3. Chattanooga Creek Survey 1981-1982, Division of Water Management, Tennessee Department of Health and Environment.

4. Neighborhood Analysis - District No. 2 - South Central City, Chattanooga-Hamilton County Regional Planning Commission and related data from the 1980 census.

5. State of Tennessee Superfund Section files, central files, and Site Investigation Unit files.

6. Water well logs, Tennessee Department of Health and Environment.

7. U.S.G.S. topographical maps - Chattanooga, Tennessee quadrangle and Fort Oglethorpe, Ga-Tenn. quadrangle.

MH/bec/d-5

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D003327251

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
D.M. Steward Manufacturing	east side of Jerome Street between 36th and 37th Streets				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG DIST**
Chattanooga	TN	37401	Hamilton	033	03

09 COORDINATES LATITUDE 34 59 04.2 LONGITUDE 085 17 44.2

10 DIRECTIONS TO SITE (Starting from nearest public road)

from east 38th Street turn north onto Jerome Street. Main plant is on the left and the site is the low, swampy area on the right.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
D.M. Steward Manufacturing Company	P.O. Box 510		
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 TELEPHONE NUMBER**
Chattanooga	TN	37401	(615) 867-4100
07 OPERATOR (If known and different from owner)	**08 STREET (Business, mailing, residential)**		
same			
09 CITY	**10 STATE**	**11 ZIP CODE**	**12 TELEPHONE NUMBER**
			( )

13 TYPE OF OWNERSHIP (Check one)
- [x] A. PRIVATE
- [ ] B. FEDERAL: ____ (Agency name)
- [ ] C. STATE
- [ ] D. COUNTY
- [ ] E. MUNICIPAL
- [ ] F. OTHER: ____ (Specify)
- [ ] G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
- [ ] A. RCRA 3001 DATE RECEIVED: __/__/__ MONTH DAY YEAR
- [ ] B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: __/__/__ MONTH DAY YEAR
- [x] C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
- [ ] YES DATE __/__/__ MONTH DAY YEAR
- [x] NO

BY (Check all that apply)
- [ ] A. EPA
- [ ] B. EPA CONTRACTOR
- [ ] C. STATE
- [ ] D. OTHER CONTRACTOR
- [ ] E. LOCAL HEALTH OFFICIAL
- [ ] F. OTHER: ____ (Specify)

CONTRACTOR NAME(S): ____

02 SITE STATUS (Check one)
- [ ] A. ACTIVE
- [x] B. INACTIVE
- [ ] C. UNKNOWN

03 YEARS OF OPERATION 1888 ? (BEGINNING YEAR) 1976 (ENDING YEAR) [ ] UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

The facility has been in operation since 1888 and has had a diverse product line ranging from pencil leads to ceramic gas burner tips to small magnets. Specific wastes mentioned include oil, metals, and methylene blue.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

In addition to draining into an unnamed tributary to Chattanooga Creek and being adjacent to a residential area, a small spring on the site indicates a shallow water table.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
- [ ] A. HIGH (Inspection required promptly)
- [x] B. MEDIUM (Inspection required)
- [ ] C. LOW (Inspect on time available basis)
- [ ] D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)		03 TELEPHONE NUMBER
John H. Woody	D.M. Steward Manufacturing		(615) 867-4100

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Michael J. Higgs	TDH&E	DSWM	615) 741-6287	6 /12 / 85 (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D003327251

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [ ] A. SOLID
- [ ] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER ____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS ____

CUBIC YARDS unknown

NO. OF DRUMS ____

03 WASTE CHARACTERISTICS (Check all that apply)

- [ ] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site Investigations Unit files

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
IN	D003327251

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 X A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ____________) — X POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

Shallow water table is indicated by the presence of a spring at the site.

01 X B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ____________) — X POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ~~unknown~~ — 04 NARRATIVE DESCRIPTION

At one time the company had a surface impoundment at the site that served as a settling basin. The site also drains into an unamed tributary to Chattanooga Creek.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ____________) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____________ — 04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ____________) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____________ — 04 NARRATIVE DESCRIPTION

01 X E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ____________) — X POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 9621 — 04 NARRATIVE DESCRIPTION

There are no security guards or fencing around site. The site is also bounded on three sides by residential areas. Population cited is an estimate of that within a one mile radius of the site.

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ____________) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ____________ (Acres) — 04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ____________) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____________ — 04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ____________) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ____________ — 04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ____________) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ____________ — 04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IN	D003327251

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 X M. UNSTABLE CONTAINMENT OF WASTES *(Spills/runoff standing liquids/leaking drums)* — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL X ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

Blue crystalline material reportedly on the surface near spring.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: 9621

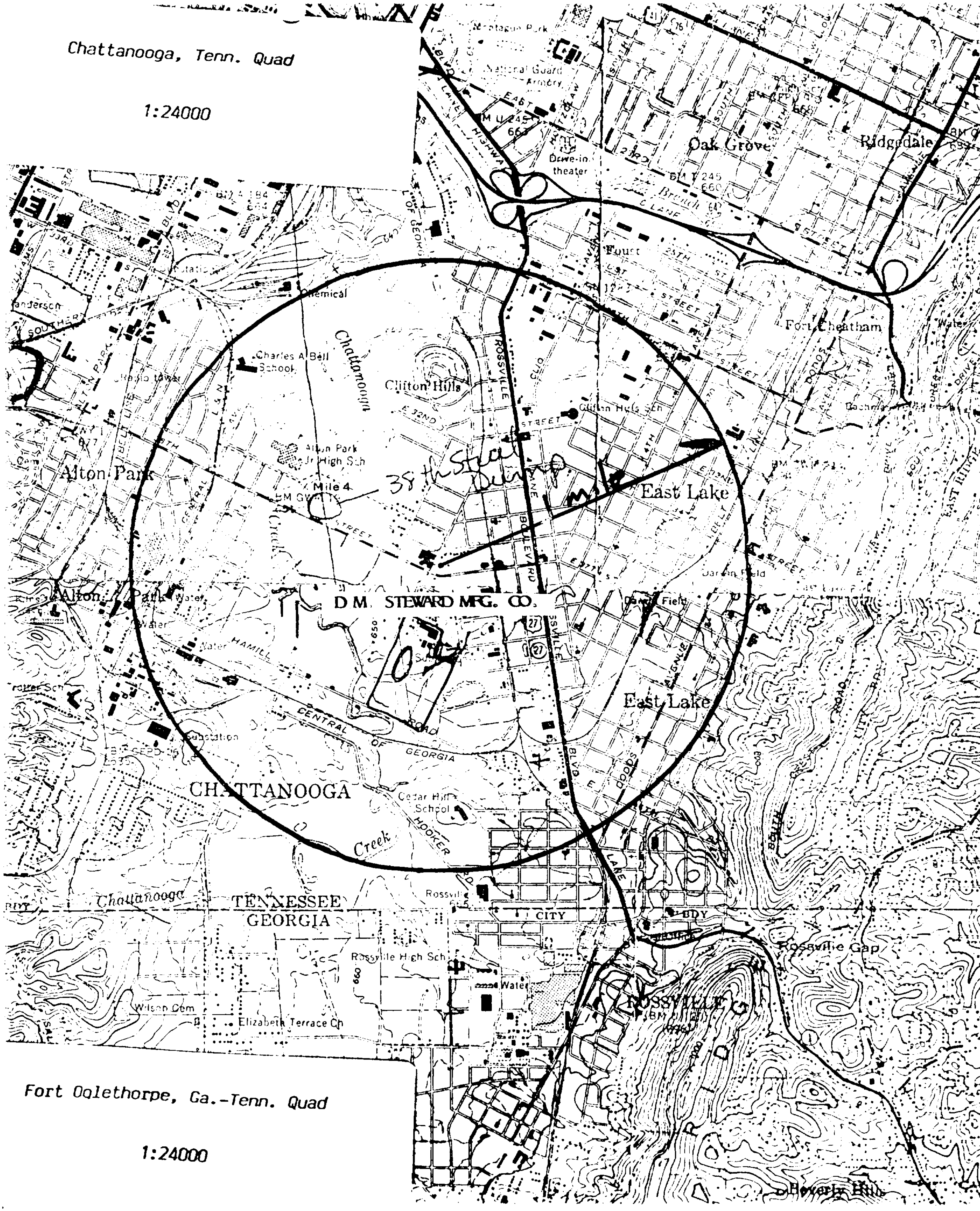
IV. COMMENTS

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

state central files, Site Investigation Unit files, Neighborhood Analysis District #2 by the Chattanooga/Hamilton County Regional Planning Commission, cursory inspection on 1/25/84.

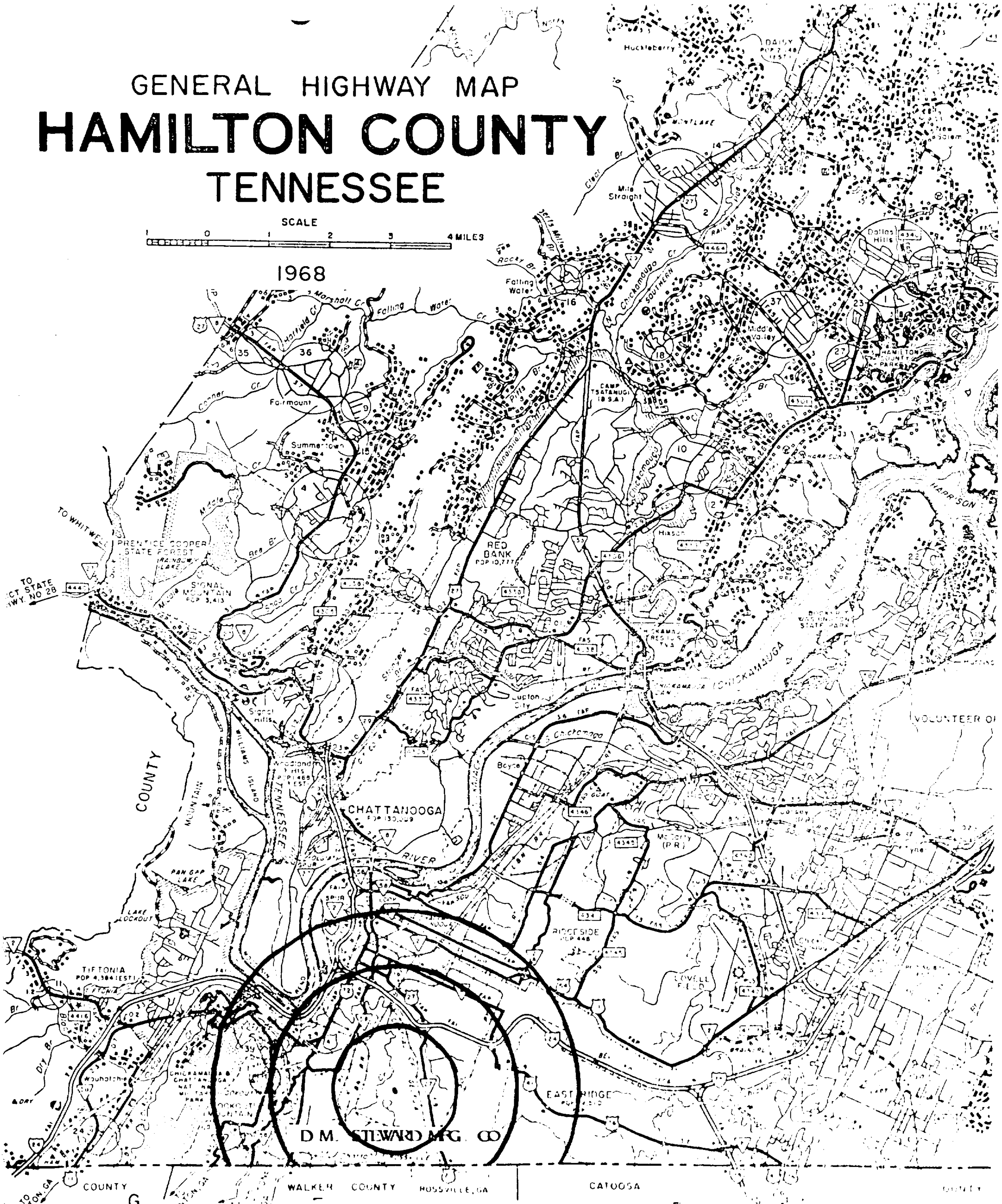
Chattanooga, Tenn. Quad

1:24000



Fort Oglethorpe, Ga.-Tenn. Quad

1:24000



1, 2, & 3 mile radii